PRACTICE EXAM 5: TRANSPORTATION CIVIL PE SIMULATION (100 QUESTIONS)

This expanded practice exam contains 100 questions aligned with the NCEES PE Civil-Transportation specification effective April 2024. The official computer-based exam contains 80 questions and provides 8 hours of examination time within a 9-hour appointment. For this 100-question simulation, allow 10 hours to preserve the official six-minutes-per-question pace. Use SI and U.S. customary units as stated. NCEES does not publish a fixed passing percentage; evaluate performance by domain and review every explanation.

1. During a feasibility assessment, a roadway pay item has an estimated quantity of 4,400 units and a unit price of $178.00 per unit. What is the estimated item cost? Select the nearest listed value.

A. 626,560.00
B. 783,200.00
C. 939,840.00
D. 1,174,800.00

2. For an owner design review, a grading operation includes 15,750 cubic yards. At a sustained production rate of 1110 cubic yards per day, how many working days are required? Select the nearest listed value.

A. 11.35
B. 17.03
C. 21.29
D. 14.19

3. During a highway modernization study, a future rehabilitation cost of $1,320,000 occurs in 5 years. Using an annual discount rate of 20.4%, what is its present worth? Select the nearest listed value.

A. 521,724.82
B. 417,379.86
C. 626,069.78
D. 782,587.23

4. For a transportation improvement program, a contractor assigns 5 identical crews for 95 days. Each crew installs 655 linear feet per day. What total length can be installed? Select the nearest listed value.

A. 248,900.00
B. 373,350.00
C. 311,125.00
D. 466,687.50

5. During an interdisciplinary coordination review, a roadway pay item has an estimated quantity of 4,560 units and a unit price of $186.00 per unit. What is the estimated item cost? Select the nearest listed value.

A. 678,528.00
B. 848,160.00
C. 1,017,792.00
D. 1,272,240.00

6. During a feasibility assessment, a grading operation includes 16,350 cubic yards. At a sustained production rate of 1150 cubic yards per day, how many working days are required? Select the nearest listed value.

A. 11.38
B. 17.06
C. 14.22
D. 21.33

7. For an owner design review, a future rehabilitation cost of $1,360,000 occurs in 6 years. Using an annual discount rate of 21.2%, what is its present worth? Select the nearest listed value.

A. 343,252.08
B. 514,878.12
C. 643,597.65
D. 429,065.10

8. During a highway modernization study, a contractor assigns 3 identical crews for 99 days. Each crew installs 675 linear feet per day. What total length can be installed? Select the nearest listed value.

A. 200,475.00
B. 160,380.00
C. 240,570.00
D. 300,712.50

9. For a transportation improvement program, a roadway pay item has an estimated quantity of 4,720 units and a unit price of $194.00 per unit. What is the estimated item cost? Select the nearest listed value.

A. 732,544.00
B. 1,098,816.00
C. 1,373,520.00
D. 915,680.00

10. During an interdisciplinary coordination review, during the peak hour, 2400 vehicles are counted, and the highest 15-minute volume is 620 vehicles. What is the peak-hour factor? Select the nearest listed value.

A. 0.78
B. 0.97
C. 1.16
D. 1.46

11. During a feasibility assessment, a freeway lane carries 3525 vehicles per hour at an average speed of 46 miles per hour. Assuming the fundamental relation q = kv, what is density? Select the nearest listed value.

A. 76.63
B. 61.30
C. 91.96
D. 114.94

12. For an owner design review, a segment experienced 100 crashes during 186 million vehicle-miles of travel. What is the crash rate in crashes per million vehicle-miles? Select the nearest listed value.

A. 0.43
B. 0.65
C. 0.54
D. 0.81

13. During a highway modernization study, current daily traffic is 20,300 vehicles. With compound annual growth of 10.8% for 11 years, what is the forecast daily traffic? Select the nearest listed value.

A. 50,179.16
B. 75,268.74
C. 94,085.92
D. 62,723.95

14. For a transportation improvement program, during the peak hour, 2480 vehicles are counted, and the highest 15-minute volume is 640 vehicles. What is the peak-hour factor? Select the nearest listed value.

A. 0.78
B. 0.97
C. 1.16
D. 1.46

15. During an interdisciplinary coordination review, a freeway lane carries 3625 vehicles per hour at an average speed of 50 miles per hour. Assuming the fundamental relation q = kv, what is density? Select the nearest listed value.

A. 72.50
B. 58.00
C. 87.00
D. 108.75

16. During a feasibility assessment, a segment experienced 104 crashes during 194 million vehicle-miles of travel. What is the crash rate in crashes per million vehicle-miles? Select the nearest listed value.

A. 0.54
B. 0.43
C. 0.65
D. 0.81

17. For an owner design review, current daily traffic is 20,700 vehicles. With compound annual growth of 11.2% for 11 years, what is the forecast daily traffic? Select the nearest listed value.

A. 53,236.93
B. 79,855.39
C. 66,546.16
D. 99,819.24

18. During a highway modernization study, during the peak hour, 2560 vehicles are counted, and the highest 15-minute volume is 660 vehicles. What is the peak-hour factor? Select the nearest listed value.

A. 0.78
B. 0.97
C. 1.16
D. 1.46

19. For a transportation improvement program, a freeway lane carries 3725 vehicles per hour at an average speed of 46 miles per hour. Assuming the fundamental relation q = kv, what is density? Select the nearest listed value.

A. 64.78
B. 97.18
C. 80.98
D. 121.47

20. During an interdisciplinary coordination review, a segment experienced 108 crashes during 202 million vehicle-miles of travel. What is the crash rate in crashes per million vehicle-miles? Select the nearest listed value.

A. 0.42
B. 0.64
C. 0.80
D. 0.53

21. During a feasibility assessment, current daily traffic is 21,100 vehicles. With compound annual growth of 11.6% for 11 years, what is the forecast daily traffic? Select the nearest listed value.

A. 56,451.90
B. 70,564.88
C. 84,677.86
D. 105,847.32

22. For an owner design review, during the peak hour, 2640 vehicles are counted, and the highest 15-minute volume is 680 vehicles. What is the peak-hour factor? Select the nearest listed value.

A. 0.97
B. 0.78
C. 1.16
D. 1.46

23. During a highway modernization study, a freeway lane carries 3825 vehicles per hour at an average speed of 50 miles per hour. Assuming the fundamental relation q = kv, what is density? Select the nearest listed value.

A. 61.20
B. 91.80
C. 114.75
D. 76.50

24. For a transportation improvement program, a traveled lane is 12 feet wide with a uniform cross slope of 3.0%. What is the elevation drop from crown to lane edge? Select the nearest listed value.

A. 0.29
B. 0.43
C. 0.36
D. 0.54

25. During an interdisciplinary coordination review, a cross section has 2 lanes, each 12 feet wide, plus two 8-foot shoulders. What is the total paved width? Select the nearest listed value.

A. 32.00
B. 40.00
C. 48.00
D. 60.00

26. During a feasibility assessment, a recoverable roadside slope descends 3 foot vertically over 194 feet horizontally. What is its horizontal-to-vertical ratio? Select the nearest listed value.

A. 51.74
B. 77.60
C. 97.00
D. 64.67

27. For an owner design review, a sidewalk segment is 970 feet long and 7 feet wide. What plan area must be constructed? Select the nearest listed value.

A. 5,432.00
B. 8,148.00
C. 6,790.00
D. 10,185.00

28. During a highway modernization study, a traveled lane is 12 feet wide with a uniform cross slope of 2.0%. What is the elevation drop from crown to lane edge? Select the nearest listed value.

A. 0.24
B. 0.19
C. 0.29
D. 0.36

29. For a transportation improvement program, a cross section has 3 lanes, each 12 feet wide, plus two 9-foot shoulders. What is the total paved width? Select the nearest listed value.

A. 43.20
B. 54.00
C. 64.80
D. 81.00

30. During an interdisciplinary coordination review, a recoverable roadside slope descends 4 foot vertically over 202 feet horizontally. What is its horizontal-to-vertical ratio? Select the nearest listed value.

A. 40.40
B. 60.60
C. 75.75
D. 50.50

31. During a feasibility assessment, a sidewalk segment is 1010 feet long and 5 feet wide. What plan area must be constructed? Select the nearest listed value.

A. 4,040.00
B. 6,060.00
C. 5,050.00
D. 7,575.00

32. For an owner design review, a traveled lane is 12 feet wide with a uniform cross slope of 2.5%. What is the elevation drop from crown to lane edge? Select the nearest listed value.

A. 0.24
B. 0.30
C. 0.36
D. 0.45

33. During a highway modernization study, a cross section has 4 lanes, each 12 feet wide, plus two 10-foot shoulders. What is the total paved width? Select the nearest listed value.

A. 68.00
B. 54.40
C. 81.60
D. 102.00

34. For a transportation improvement program, a simple circular curve has radius 3500 feet and central angle 180 degrees. What is its arc length? Select the nearest listed value.

A. 8,796.46
B. 13,194.68
C. 16,493.35
D. 10,995.57

35. During an interdisciplinary coordination review, a simple circular curve has radius 3535 feet and intersection angle 182 degrees. What is the tangent length? Select the nearest listed value.

A. -162,016.01
B. -243,024.01
C. -202,520.01
D. -303,780.02

36. During a feasibility assessment, for a circular curve with radius 3570 feet and central angle 184 degrees, what is the middle ordinate? Select the nearest listed value.

A. 3,694.59
B. 2,955.67
C. 4,433.51
D. 5,541.89

37. For an owner design review, for a circular curve with radius 3605 feet and central angle 186 degrees, what is the long chord? Select the nearest listed value.

A. 5,760.10
B. 8,640.14
C. 10,800.18
D. 7,200.12

38. During a highway modernization study, a simple circular curve has radius 3640 feet and central angle 188 degrees. What is its arc length? Select the nearest listed value.

A. 11,943.64
B. 9,554.91
C. 14,332.37
D. 17,915.46

39. For a transportation improvement program, a simple circular curve has radius 3675 feet and intersection angle 190 degrees. What is the tangent length? Select the nearest listed value.

A. -33,604.35
B. -42,005.44
C. -50,406.53
D. -63,008.16

40. During an interdisciplinary coordination review, for a circular curve with radius 3710 feet and central angle 192 degrees, what is the middle ordinate? Select the nearest listed value.

A. 3,278.24
B. 4,917.36
C. 4,097.80
D. 6,146.70

41. During a feasibility assessment, for a circular curve with radius 3745 feet and central angle 194 degrees, what is the long chord? Select the nearest listed value.

A. 5,947.34
B. 8,921.00
C. 11,151.26
D. 7,434.17

42. For an owner design review, a simple circular curve has radius 3780 feet and central angle 196 degrees. What is its arc length? Select the nearest listed value.

A. 12,930.80
B. 10,344.64
C. 15,516.96
D. 19,396.20

43. During a highway modernization study, a simple circular curve has radius 3815 feet and intersection angle 198 degrees. What is the tangent length? Select the nearest listed value.

A. -19,269.57
B. -24,086.96
C. -28,904.35
D. -36,130.44

44. For a transportation improvement program, for a circular curve with radius 3850 feet and central angle 200 degrees, what is the middle ordinate? Select the nearest listed value.

A. 3,614.84
B. 5,422.26
C. 6,777.83
D. 4,518.55

45. During an interdisciplinary coordination review, a vertical curve connects grades of 6.50% and +14.50%. What is the algebraic grade difference A? Select the nearest listed value.

A. 6.40
B. 9.60
C. 8.00
D. 12.00

46. During a feasibility assessment, a vertical curve is 2625 feet long and has an algebraic grade difference of 5%. What is its K value? Select the nearest listed value.

A. 525.00
B. 420.00
C. 630.00
D. 787.50

47. For an owner design review, a tangent begins at elevation 746.00 feet and rises at 10.20% for 1120 feet. What is the ending elevation? Select the nearest listed value.

A. 688.19
B. 1,032.29
C. 860.24
D. 1,290.36

48. During a highway modernization study, an overhead structure has a low-chord elevation of 24.80 feet above a datum. The roadway surface is at elevation 6.50 feet. What is the vertical clearance? Select the nearest listed value.

A. 14.64
B. 18.30
C. 21.96
D. 27.45

49. For a transportation improvement program, a vertical curve connects grades of 6.90% and +15.10%. What is the algebraic grade difference A? Select the nearest listed value.

A. 6.56
B. 9.84
C. 8.20
D. 12.30

50. During an interdisciplinary coordination review, a vertical curve is 2725 feet long and has an algebraic grade difference of 4%. What is its K value? Select the nearest listed value.

A. 681.25
B. 545.00
C. 817.50
D. 1,021.88

51. During a feasibility assessment, a tangent begins at elevation 758.00 feet and rises at 10.60% for 1160 feet. What is the ending elevation? Select the nearest listed value.

A. 704.77
B. 1,057.15
C. 1,321.44
D. 880.96

52. For an owner design review, an overhead structure has a low-chord elevation of 25.20 feet above a datum. The roadway surface is at elevation 4.50 feet. What is the vertical clearance? Select the nearest listed value.

A. 16.56
B. 20.70
C. 24.84
D. 31.05

53. During a highway modernization study, a vertical curve connects grades of 7.30% and +15.70%. What is the algebraic grade difference A? Select the nearest listed value.

A. 6.72
B. 8.40
C. 10.08
D. 12.60

54. For a transportation improvement program, a vertical curve is 2825 feet long and has an algebraic grade difference of 8%. What is its K value? Select the nearest listed value.

A. 282.50
B. 423.74
C. 353.12
D. 529.68

55. During an interdisciplinary coordination review, a tangent begins at elevation 770.00 feet and rises at 11.00% for 1200 feet. What is the ending elevation? Select the nearest listed value.

A. 902.00
B. 721.60
C. 1,082.40
D. 1,353.00

56. During a feasibility assessment, a vehicle approaches an intersection at 190 miles per hour. If the design gap is 6 seconds, what distance does it travel during the gap? Select the nearest listed value.

A. 1,337.60
B. 2,006.40
C. 2,508.00
D. 1,672.00

57. For an owner design review, a left-turn bay must store 89 passenger vehicles. Using 25 feet of storage per vehicle, what storage length is required? Select the nearest listed value.

A. 1,780.00
B. 2,670.00
C. 3,337.50
D. 2,225.00

58. During a highway modernization study, a channelized intersection uses a circular curb return with radius 209 feet through 152 degrees. What is the curb-return arc length? Select the nearest listed value.

A. 443.57
B. 554.46
C. 665.35
D. 831.69

59. For a transportation improvement program, an arterial intersection has 4 through lanes in each direction, 12-foot lanes, and a 99-foot median. What is the curb-to-curb crossing width, excluding shoulders? Select the nearest listed value.

A. 156.00
B. 234.00
C. 195.00
D. 292.50

60. During an interdisciplinary coordination review, a vehicle approaches an intersection at 198 miles per hour. If the design gap is 6 seconds, what distance does it travel during the gap? Select the nearest listed value.

A. 1,742.40
B. 1,393.92
C. 2,090.88
D. 2,613.60

61. During a feasibility assessment, a left-turn bay must store 93 passenger vehicles. Using 25 feet of storage per vehicle, what storage length is required? Select the nearest listed value.

A. 1,860.00
B. 2,325.00
C. 2,790.00
D. 3,487.50

62. For an owner design review, a channelized intersection uses a circular curb return with radius 217 feet through 156 degrees. What is the curb-return arc length? Select the nearest listed value.

A. 472.66
B. 709.00
C. 590.83
D. 886.25

63. During a highway modernization study, an arterial intersection has 2 through lanes in each direction, 12-foot lanes, and a 103-foot median. What is the curb-to-curb crossing width, excluding shoulders? Select the nearest listed value.

A. 120.80
B. 181.20
C. 226.50
D. 151.00

64. For a transportation improvement program, a vehicle approaches an intersection at 206 miles per hour. If the design gap is 6 seconds, what distance does it travel during the gap? Select the nearest listed value.

A. 1,812.80
B. 1,450.24
C. 2,175.36
D. 2,719.20

65. During an interdisciplinary coordination review, a left-turn bay must store 97 passenger vehicles. Using 25 feet of storage per vehicle, what storage length is required? Select the nearest listed value.

A. 1,940.00
B. 2,910.00
C. 3,637.50
D. 2,425.00

66. During a feasibility assessment, a signal has a 490-second cycle, 112 seconds of displayed green, and 4 seconds of phase lost time. What effective-green ratio applies to the phase? Select the nearest listed value.

A. 0.22
B. 0.18
C. 0.26
D. 0.33

67. For an owner design review, a lane group has saturation flow of 1900 vehicles per hour of green and an effective-green ratio of 1.97. What is its capacity? Select the nearest listed value.

A. 2,994.40
B. 4,491.60
C. 3,743.00
D. 5,614.50

68. During a highway modernization study, a pedestrian must cross 224 feet. Using a 7-second start interval and walking speed of 3.5 feet per second, what total pedestrian timing is required? Select the nearest listed value.

A. 56.80
B. 71.00
C. 85.20
D. 106.50

69. For a transportation improvement program, a four-phase signal has 11.80 seconds of lost time per phase. What is the total lost time per cycle? Select the nearest listed value.

A. 37.76
B. 56.64
C. 47.20
D. 70.80

70. During an interdisciplinary coordination review, a signal has a 510-second cycle, 116 seconds of displayed green, and 4 seconds of phase lost time. What effective-green ratio applies to the phase? Select the nearest listed value.

A. 0.18
B. 0.22
C. 0.26
D. 0.33

71. During a feasibility assessment, a lane group has saturation flow of 1900 vehicles per hour of green and an effective-green ratio of 2.05. What is its capacity? Select the nearest listed value.

A. 3,116.00
B. 4,674.00
C. 5,842.50
D. 3,895.00

72. For an owner design review, a pedestrian must cross 232 feet. Using a 7-second start interval and walking speed of 3.5 feet per second, what total pedestrian timing is required? Select the nearest listed value.

A. 73.29
B. 58.63
C. 87.95
D. 109.94

73. During a highway modernization study, for a work-zone taper on a roadway operating at 35 mph, use L = WS^2/60 with offset W = 12 feet. What taper length results? Select the nearest listed value.

A. 196.00
B. 294.00
C. 367.50
D. 245.00

74. For a transportation improvement program, a channelizing line contains 90 devices at 890-foot spacing. What distance separates the first and last device? Select the nearest listed value.

A. 79,210.00
B. 63,368.00
C. 95,052.00
D. 118,815.00

75. During an interdisciplinary coordination review, a broken lane line extends 5300 feet using a 10-foot stripe and 30-foot gap. Approximately how many complete stripe-gap cycles fit in the segment? Select the nearest listed value.

A. 106.00
B. 159.00
C. 132.50
D. 198.75

76. During a feasibility assessment, a temporary warning sequence should provide 10 seconds of preview at 128 mph. What advance distance corresponds to that travel time? Select the nearest listed value.

A. 1,501.86
B. 1,877.33
C. 2,252.80
D. 2,815.99

77. For an owner design review, for a work-zone taper on a roadway operating at 55 mph, use L = WS^2/60 with offset W = 12 feet. What taper length results? Select the nearest listed value.

A. 484.00
B. 726.00
C. 907.50
D. 605.00

78. During a highway modernization study, a channelizing line contains 94 devices at 930-foot spacing. What distance separates the first and last device? Select the nearest listed value.

A. 69,192.00
B. 86,490.00
C. 103,788.00
D. 129,735.00

79. For a transportation improvement program, a broken lane line extends 5500 feet using a 10-foot stripe and 30-foot gap. Approximately how many complete stripe-gap cycles fit in the segment? Select the nearest listed value.

A. 110.00
B. 165.00
C. 137.50
D. 206.25

80. During an interdisciplinary coordination review, compacted soil has moist unit weight 285.00 pcf and water content 48.0%. What is its dry unit weight? Select the nearest listed value.

A. 192.57
B. 154.06
C. 231.08
D. 288.86

81. During a feasibility assessment, a field dry unit weight is 280.00 pcf and laboratory maximum dry unit weight is 286.00 pcf. What is relative compaction? Select the nearest listed value.

A. 78.32
B. 117.48
C. 97.90
D. 146.85

82. For an owner design review, a soil element contains 2.06 cubic foot of voids and 1.40 cubic foot of solids. What is the void ratio? Select the nearest listed value.

A. 1.18
B. 1.76
C. 2.21
D. 1.47

83. During a highway modernization study, a design lane carries 2560 trucks per day, and the adopted equivalency factor is 5.95 ESAL per truck. What is the daily ESAL loading? Select the nearest listed value.

A. 15,232.00
B. 12,185.60
C. 18,278.40
D. 22,848.00

84. For a transportation improvement program, compacted soil has moist unit weight 293.00 pcf and water content 50.0%. What is its dry unit weight? Select the nearest listed value.

A. 156.26
B. 195.33
C. 234.40
D. 293.00

85. During an interdisciplinary coordination review, a field dry unit weight is 288.00 pcf and laboratory maximum dry unit weight is 294.00 pcf. What is relative compaction? Select the nearest listed value.

A. 78.37
B. 97.96
C. 117.55
D. 146.94

86. During a feasibility assessment, a soil element contains 2.14 cubic foot of voids and 1.44 cubic foot of solids. What is the void ratio? Select the nearest listed value.

A. 1.49
B. 1.19
C. 1.79
D. 2.23

87. For an owner design review, a design lane carries 2640 trucks per day, and the adopted equivalency factor is 6.15 ESAL per truck. What is the daily ESAL loading? Select the nearest listed value.

A. 12,988.80
B. 19,483.20
C. 16,236.00
D. 24,354.00

88. During a highway modernization study, compacted soil has moist unit weight 301.00 pcf and water content 52.0%. What is its dry unit weight? Select the nearest listed value.

A. 158.42
B. 237.64
C. 297.05
D. 198.03

89. For a transportation improvement program, using Q = CiA, find peak runoff for C = 1.45, rainfall intensity i = 11.20 inches per hour, and drainage area A = 98 acres. Select the nearest listed value.

A. 1,273.22
B. 1,591.52
C. 1,909.82
D. 2,387.28

90. During an interdisciplinary coordination review, a circular storm drain has inside diameter 10.60 feet. What is its full cross-sectional flow area? Select the nearest listed value.

A. 70.60
B. 105.90
C. 132.38
D. 88.25

91. During a feasibility assessment, a culvert conveys 212.00 cubic feet per second through a flow area of 22.40 square feet. What is mean velocity? Select the nearest listed value.

A. 9.46
B. 7.57
C. 11.35
D. 14.19

92. For an owner design review, a rectangular roadside channel carries water 9.80 feet deep across a bottom width of 91 feet. What is the flow area, neglecting side-slope contribution? Select the nearest listed value.

A. 713.44
B. 1,070.16
C. 891.80
D. 1,337.70

93. During a highway modernization study, using Q = CiA, find peak runoff for C = 1.49, rainfall intensity i = 11.60 inches per hour, and drainage area A = 102 acres. Select the nearest listed value.

A. 1,762.97
B. 1,410.38
C. 2,115.56
D. 2,644.45

94. For a transportation improvement program, a circular storm drain has inside diameter 11.00 feet. What is its full cross-sectional flow area? Select the nearest listed value.

A. 76.02
B. 114.04
C. 95.03
D. 142.55

95. During an interdisciplinary coordination review, a culvert conveys 220.00 cubic feet per second through a flow area of 23.20 square feet. What is mean velocity? Select the nearest listed value.

A. 7.58
B. 11.38
C. 14.22
D. 9.48

96. During a feasibility assessment, a rectangular roadside channel carries water 10.20 feet deep across a bottom width of 95 feet. What is the flow area, neglecting side-slope contribution? Select the nearest listed value.

A. 775.20
B. 969.00
C. 1,162.80
D. 1,453.50

97. For an owner design review, using Q = CiA, find peak runoff for C = 1.53, rainfall intensity i = 12.00 inches per hour, and drainage area A = 106 acres. Select the nearest listed value.

A. 1,946.16
B. 1,556.93
C. 2,335.39
D. 2,919.24

98. During a highway modernization study, a circular storm drain has inside diameter 11.40 feet. What is its full cross-sectional flow area? Select the nearest listed value.

A. 81.66
B. 102.07
C. 122.48
D. 153.10

99. For a transportation improvement program, a culvert conveys 228.00 cubic feet per second through a flow area of 24.00 square feet. What is mean velocity? Select the nearest listed value.

A. 7.60
B. 11.40
C. 14.25
D. 9.50

100. During an interdisciplinary coordination review, a rectangular roadside channel carries water 10.60 feet deep across a bottom width of 99 feet. What is the flow area, neglecting side-slope contribution? Select the nearest listed value.

A. 839.52

B. 1,259.28

C. 1,049.40

D. 1,574.10

Practice Exam 5: Answer Key and Explanations

1. B — Using the stated data, the cost is quantity times unit price: 4,400 x $178.00 = $783,200.00. Therefore, the keyed value is the only option consistent with the governing relationship. A quantity takeoff becomes a cost only after multiplication by the applicable bid or planning unit price. The distractors represent omitted factors, reversed operations, or failure to discount or scale the.

2. D — Using the stated data, duration equals work divided by production, or 15,750/1110 = 14.19 days. Therefore, the keyed value is the only option consistent with the governing relationship. Production-based duration links measured scope to schedule time before logic ties are applied. The distractors represent omitted factors, reversed operations, or failure to discount or scale the work correctly.

3. A — Using the stated data, discounting gives $1,320,000/(1+0.204)^5 = $521,724.82. Therefore, the keyed value is the only option consistent with the governing relationship. Present worth converts a future expenditure to an equivalent value at the analysis date. The distractors represent omitted factors, reversed operations, or failure to discount or scale the work correctly.

4. C — Using the stated data, total output is 5 x 95 x 655 = 311,125.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Total planned output is the product of crew count, available days, and daily productivity. The distractors represent omitted factors, reversed operations, or failure to discount or scale the work correctly.

5. B — Using the stated data, the cost is quantity times unit price: 4,560 x $186.00 = $848,160.00. Therefore, the keyed value is the only option consistent with the governing relationship. A quantity takeoff becomes a cost only after multiplication by the applicable bid or planning unit price. The distractors represent omitted factors, reversed operations, or failure to discount or scale the.

6. C — Using the stated data, duration equals work divided by production, or 16,350/1150 = 14.22 days. Therefore, the keyed value is the only option consistent with the governing relationship. Production-based duration links measured scope to schedule time before logic ties are applied. The distractors represent omitted factors, reversed operations, or failure to discount or scale the work correctly.

7. D — Using the stated data, discounting gives $1,360,000/(1+0.212)^6 = $429,065.10. Therefore, the keyed value is the only option consistent with the governing relationship. Present worth converts a future expenditure to an equivalent value at the analysis date. The distractors represent omitted factors, reversed operations, or failure to discount or scale the work correctly.

8. A — Using the stated data, total output is 3 x 99 x 675 = 200,475.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Total planned output is the product of crew count, available days, and daily productivity. The distractors represent omitted factors, reversed operations, or failure to discount or scale the work correctly.

9. D — Using the stated data, the cost is quantity times unit price: 4,720 x $194.00 = $915,680.00. Therefore, the keyed value is the only option consistent with the governing relationship. A quantity takeoff becomes a cost only after multiplication by the applicable bid or planning unit price. The distractors represent omitted factors, reversed operations, or failure to discount or scale the.

10. B — Using the stated data, PHF = 2400/(4 x 620) = 0.97. Therefore, the keyed value is the only option consistent with the governing relationship. The factor compares the full-hour volume with the hourly equivalent of the most intense quarter hour. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound growth.

11. A — Using the stated data, density is flow divided by speed: 3525/46 = 76.63 vehicles per mile. Therefore, the keyed value is the only option consistent with the governing relationship. The fundamental traffic-flow relationship requires consistent hourly flow and speed units. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound growth.

12. C — Using the stated data, the normalized crash rate is 100/186 = 0.54 crashes per million vehicle-miles. Therefore, the keyed value is the only option consistent with the governing relationship. Exposure normalization permits safety comparisons among facilities carrying different traffic volumes over different lengths. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound.

13. D — Using the stated data, compound growth gives 20,300(1+0.108)^11 = 62,723.95 vehicles per day. Therefore, the keyed value is the only option consistent with the governing relationship. Compound forecasting applies growth to the increasing total each year rather than only to the original base. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound.

14. B — Using the stated data, PHF = 2480/(4 x 640) = 0.97. Therefore, the keyed value is the only option consistent with the governing relationship. The factor compares the full-hour volume with the hourly equivalent of the most intense quarter hour. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound growth.

15. A — Using the stated data, density is flow divided by speed: 3625/50 = 72.50 vehicles per mile. Therefore, the keyed value is the only option consistent with the governing relationship. The fundamental traffic-flow relationship requires consistent hourly flow and speed units. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound growth.

16. A — Using the stated data, the normalized crash rate is 104/194 = 0.54 crashes per million vehicle-miles. Therefore, the keyed value is the only option consistent with the governing relationship. Exposure normalization permits safety comparisons among facilities carrying different traffic volumes over different lengths. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound.

17. C — Using the stated data, compound growth gives 20,700(1+0.112)^11 = 66,546.16 vehicles per day. Therefore, the keyed value is the only option consistent with the governing relationship. Compound forecasting applies growth to the increasing total each year rather than only to the original base. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound.

18. B — Using the stated data, PHF = 2560/(4 x 660) = 0.97. Therefore, the keyed value is the only option consistent with the governing relationship. The factor compares the full-hour volume with the hourly equivalent of the most intense quarter hour. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound growth.

19. C — Using the stated data, density is flow divided by speed: 3725/46 = 80.98 vehicles per mile. Therefore, the keyed value is the only option consistent with the governing relationship. The fundamental traffic-flow relationship requires consistent hourly flow and speed units. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound growth.

20. D — Using the stated data, the normalized crash rate is 108/202 = 0.53 crashes per million vehicle-miles. Therefore, the keyed value is the only option consistent with the governing relationship. Exposure normalization permits safety comparisons among facilities carrying different traffic volumes over different lengths. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound.

21. B — Using the stated data, compound growth gives 21,100(1+0.116)^11 = 70,564.88 vehicles per day. Therefore, the keyed value is the only option consistent with the governing relationship. Compound forecasting applies growth to the increasing total each year rather than only to the original base. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound.

22. A — Using the stated data, PHF = 2640/(4 x 680) = 0.97. Therefore, the keyed value is the only option consistent with the governing relationship. The factor compares the full-hour volume with the hourly equivalent of the most intense quarter hour. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound growth.

23. D — Using the stated data, density is flow divided by speed: 3825/50 = 76.50 vehicles per mile. Therefore, the keyed value is the only option consistent with the governing relationship. The fundamental traffic-flow relationship requires consistent hourly flow and speed units. The incorrect choices reflect common mistakes involving peak conversion, exposure, unit consistency, or simple rather than compound growth.

24. C — Using the stated data, drop equals width times decimal slope: 12 x 0.030 = 0.36 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Cross slope is a dimensionless rise-over-run ratio, so percent must be converted to decimal form. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a.

25. B — Using the stated data, paved width is 2 x 12 + 2 x 8 = 40.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Every traveled lane and both shoulders contribute to the full paved platform width. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a ratio.

26. D — Using the stated data, the H:V ratio is 194/3 = 64.67 to 1. Therefore, the keyed value is the only option consistent with the governing relationship. Roadside slopes are commonly described as horizontal distance for each unit of vertical change. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a ratio with its reciprocal.

27. C — Using the stated data, rectangular area is 970 x 7 = 6,790.00 square feet. Therefore, the keyed value is the only option consistent with the governing relationship. Plan area supports material quantity calculations when thickness is handled as a separate dimension. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a ratio with its.

28. A — Using the stated data, drop equals width times decimal slope: 12 x 0.020 = 0.24 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Cross slope is a dimensionless rise-over-run ratio, so percent must be converted to decimal form. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a.

29. B — Using the stated data, paved width is 3 x 12 + 2 x 9 = 54.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Every traveled lane and both shoulders contribute to the full paved platform width. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a ratio.

30. D — Using the stated data, the H:V ratio is 202/4 = 50.50 to 1. Therefore, the keyed value is the only option consistent with the governing relationship. Roadside slopes are commonly described as horizontal distance for each unit of vertical change. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a ratio with its reciprocal.

31. C — Using the stated data, rectangular area is 1010 x 5 = 5,050.00 square feet. Therefore, the keyed value is the only option consistent with the governing relationship. Plan area supports material quantity calculations when thickness is handled as a separate dimension. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a ratio with its.

32. B — Using the stated data, drop equals width times decimal slope: 12 x 0.025 = 0.30 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Cross slope is a dimensionless rise-over-run ratio, so percent must be converted to decimal form. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a.

33. A — Using the stated data, paved width is 4 x 12 + 2 x 10 = 68.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Every traveled lane and both shoulders contribute to the full paved platform width. The distractors arise from ignoring one side, treating percent as a whole number, or confusing a ratio.

34. D — Using the stated data, arc length is pi(3500)(180)/180 = 10995.57 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The degree angle must be converted through the pi-over-180 factor when computing circular arc length. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a different curve element.

35. C — Using the stated data, T = R tan(delta/2) = 3535 tan(182/2) = -202520.01 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The tangent distance runs from the point of intersection to either tangent point. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a different curve.

36. A — Using the stated data, M = R[1-cos(delta/2)] = 3694.59 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The middle ordinate is measured from the midpoint of the long chord to the curve along the radial line. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a.

37. D — Using the stated data, LC = 2R sin(delta/2) = 7200.12 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The long chord directly joins the beginning and end points of the circular curve. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a different curve element.

38. A — Using the stated data, arc length is pi(3640)(188)/180 = 11943.64 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The degree angle must be converted through the pi-over-180 factor when computing circular arc length. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a different curve element.

39. B — Using the stated data, T = R tan(delta/2) = 3675 tan(190/2) = -42005.44 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The tangent distance runs from the point of intersection to either tangent point. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a different curve.

40. C — Using the stated data, M = R[1-cos(delta/2)] = 4097.80 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The middle ordinate is measured from the midpoint of the long chord to the curve along the radial line. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a.

41. D — Using the stated data, LC = 2R sin(delta/2) = 7434.17 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The long chord directly joins the beginning and end points of the circular curve. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a different curve element.

42. A — Using the stated data, arc length is pi(3780)(196)/180 = 12930.80 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The degree angle must be converted through the pi-over-180 factor when computing circular arc length. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a different curve element.

43. B — Using the stated data, T = R tan(delta/2) = 3815 tan(198/2) = -24086.96 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The tangent distance runs from the point of intersection to either tangent point. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a different curve.

44. D — Using the stated data, M = R[1-cos(delta/2)] = 4518.55 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The middle ordinate is measured from the midpoint of the long chord to the curve along the radial line. The alternatives correspond to using the full angle instead of the half angle, omitting conversion, or selecting a.

45. C — Using the stated data, A is the absolute grade difference: |14.50-(6.50)| = 8.00%. Therefore, the keyed value is the only option consistent with the governing relationship. Opposite-signed grades add in magnitude when determining the vertical curve's algebraic grade difference. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation difference is required.

46. A — Using the stated data, K equals length divided by algebraic grade difference: 2625/5 = 525.00 feet per percent. Therefore, the keyed value is the only option consistent with the governing relationship. K expresses the horizontal length supplied for each percentage point of grade change. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation.

47. C — Using the stated data, elevation change is 0.102 x 1120 = 114.24 feet, yielding 860.24 feet. Therefore, the keyed value is the only option consistent with the governing relationship. A positive decimal grade increases elevation in the direction of stationing. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation difference is required.

48. B — Using the stated data, clearance is the elevation difference: 24.80-6.50 = 18.30 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Vertical clearance is measured between the roadway surface and the controlling overhead obstruction. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation difference is required.

49. C — Using the stated data, A is the absolute grade difference: |15.10-(6.90)| = 8.20%. Therefore, the keyed value is the only option consistent with the governing relationship. Opposite-signed grades add in magnitude when determining the vertical curve's algebraic grade difference. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation difference is required.

50. A — Using the stated data, K equals length divided by algebraic grade difference: 2725/4 = 681.25 feet per percent. Therefore, the keyed value is the only option consistent with the governing relationship. K expresses the horizontal length supplied for each percentage point of grade change. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation.

51. D — Using the stated data, elevation change is 0.106 x 1160 = 122.96 feet, yielding 880.96 feet. Therefore, the keyed value is the only option consistent with the governing relationship. A positive decimal grade increases elevation in the direction of stationing. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation difference is required.

52. B — Using the stated data, clearance is the elevation difference: 25.20-4.50 = 20.70 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Vertical clearance is measured between the roadway surface and the controlling overhead obstruction. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation difference is required.

53. B — Using the stated data, A is the absolute grade difference: |15.70-(7.30)| = 8.40%. Therefore, the keyed value is the only option consistent with the governing relationship. Opposite-signed grades add in magnitude when determining the vertical curve's algebraic grade difference. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation difference is required.

54. C — Using the stated data, K equals length divided by algebraic grade difference: 2825/8 = 353.12 feet per percent. Therefore, the keyed value is the only option consistent with the governing relationship. K expresses the horizontal length supplied for each percentage point of grade change. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation.

55. A — Using the stated data, elevation change is 0.110 x 1200 = 132.00 feet, yielding 902.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. A positive decimal grade increases elevation in the direction of stationing. The distractors reflect sign errors, percent conversion mistakes, reciprocal K calculations, or addition where an elevation difference is required.

56. D — Using the stated data, distance is 190 x 1.4667 x 6 = 1672.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The speed conversion from miles per hour to feet per second is required before multiplying by time. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using.

57. D — Using the stated data, storage length is 89 x 25 = 2225.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Queue storage is the product of design vehicle count and the adopted effective space per queued vehicle. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using degrees.

58. B — Using the stated data, arc length is pi(209)(152)/180 = 554.46 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Curb-return length follows the same circular arc relation used for other horizontal curves. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using degrees directly without circular conversion.

59. C — Using the stated data, width is 2 x 4 x 12 + 99 = 195.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The crossing includes directional traveled ways on both sides plus the central median. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using degrees directly.

60. A — Using the stated data, distance is 198 x 1.4667 x 6 = 1742.40 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The speed conversion from miles per hour to feet per second is required before multiplying by time. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using.

61. B — Using the stated data, storage length is 93 x 25 = 2325.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Queue storage is the product of design vehicle count and the adopted effective space per queued vehicle. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using degrees.

62. C — Using the stated data, arc length is pi(217)(156)/180 = 590.83 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Curb-return length follows the same circular arc relation used for other horizontal curves. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using degrees directly without circular conversion.

63. D — Using the stated data, width is 2 x 2 x 12 + 103 = 151.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The crossing includes directional traveled ways on both sides plus the central median. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using degrees directly.

64. A — Using the stated data, distance is 206 x 1.4667 x 6 = 1812.80 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The speed conversion from miles per hour to feet per second is required before multiplying by time. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using.

65. D — Using the stated data, storage length is 97 x 25 = 2425.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Queue storage is the product of design vehicle count and the adopted effective space per queued vehicle. The alternatives result from omitting a direction, forgetting the median, failing to convert speed, or using degrees.

66. A — Using the stated data, effective green ratio is (112-4)/490 = 0.22. Therefore, the keyed value is the only option consistent with the governing relationship. Only effective green, after subtracting lost time, contributes to the usable fraction of the cycle. The distractors reflect use of displayed rather than effective green, omission of startup time, or division where proportional capacity requires multiplication.

67. C — Using the stated data, capacity is saturation flow times green ratio: 1900 x 1.97 = 3743.00 vehicles per hour. Therefore, the keyed value is the only option consistent with the governing relationship. Signalized capacity scales the ideal discharge rate by the share of cycle effectively available. The distractors reflect use of displayed rather than effective green, omission of startup time,.

68. B — Using the stated data, timing is 7 + 224/3.5 = 71.00 seconds. Therefore, the keyed value is the only option consistent with the governing relationship. Total timing combines the initial interval with the time needed to traverse the crossing distance. The distractors reflect use of displayed rather than effective green, omission of startup time, or division where proportional capacity requires.

69. C — Using the stated data, cycle lost time is 4 x 11.80 = 47.20 seconds. Therefore, the keyed value is the only option consistent with the governing relationship. Total cycle lost time accumulates the startup and clearance losses associated with each phase. The distractors reflect use of displayed rather than effective green, omission of startup time, or division where proportional capacity.

70. B — Using the stated data, effective green ratio is (116-4)/510 = 0.22. Therefore, the keyed value is the only option consistent with the governing relationship. Only effective green, after subtracting lost time, contributes to the usable fraction of the cycle. The distractors reflect use of displayed rather than effective green, omission of startup time, or division where proportional capacity requires multiplication.

71. D — Using the stated data, capacity is saturation flow times green ratio: 1900 x 2.05 = 3895.00 vehicles per hour. Therefore, the keyed value is the only option consistent with the governing relationship. Signalized capacity scales the ideal discharge rate by the share of cycle effectively available. The distractors reflect use of displayed rather than effective green, omission of startup time,.

72. A — Using the stated data, timing is 7 + 232/3.5 = 73.29 seconds. Therefore, the keyed value is the only option consistent with the governing relationship. Total timing combines the initial interval with the time needed to traverse the crossing distance. The distractors reflect use of displayed rather than effective green, omission of startup time, or division where proportional capacity requires.

73. D — Using the stated data, L = 12(35)^2/60 = 245.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The stated low-speed taper relation makes length proportional to offset and to the square of speed. The alternatives commonly omit a gap, count devices instead of spaces, misuse the speed conversion, or fail to square speed in.

74. A — Using the stated data, there are 89 spaces, so distance is 89 x 890 = 79210.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The number of intervals between objects is one less than the number of objects. The alternatives commonly omit a gap, count devices instead of spaces, misuse the speed conversion, or.

75. C — Using the stated data, cycle length is 10+30 = 40 feet, so count is 5300/40 = 132.50. Therefore, the keyed value is the only option consistent with the governing relationship. Both the marked stripe and following gap occupy longitudinal distance in each repeating cycle. The alternatives commonly omit a gap, count devices instead of spaces, misuse the speed conversion, or.

76. B — Using the stated data, distance is 128 x 1.4667 x 10 = 1877.33 feet. Therefore, the keyed value is the only option consistent with the governing relationship. Preview distance follows from converting operating speed to feet per second and multiplying by available time. The alternatives commonly omit a gap, count devices instead of spaces, misuse the speed conversion, or fail.

77. D — Using the stated data, L = 12(55)^2/60 = 605.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The stated low-speed taper relation makes length proportional to offset and to the square of speed. The alternatives commonly omit a gap, count devices instead of spaces, misuse the speed conversion, or fail to square speed in.

78. B — Using the stated data, there are 93 spaces, so distance is 93 x 930 = 86490.00 feet. Therefore, the keyed value is the only option consistent with the governing relationship. The number of intervals between objects is one less than the number of objects. The alternatives commonly omit a gap, count devices instead of spaces, misuse the speed conversion, or.

79. C — Using the stated data, cycle length is 10+30 = 40 feet, so count is 5500/40 = 137.50. Therefore, the keyed value is the only option consistent with the governing relationship. Both the marked stripe and following gap occupy longitudinal distance in each repeating cycle. The alternatives commonly omit a gap, count devices instead of spaces, misuse the speed conversion, or.

80. A — Using the stated data, dry unit weight is 285.00/(1+0.480) = 192.57 pcf. Therefore, the keyed value is the only option consistent with the governing relationship. Moist unit weight includes water mass, so dividing by one plus decimal water content isolates dry solids. The distractors result from reversing density ratios, confusing void ratio with porosity, treating percent as decimal, or dividing.

81. C — Using the stated data, relative compaction is 100(280.00/286.00) = 97.90%. Therefore, the keyed value is the only option consistent with the governing relationship. Relative compaction compares achieved field density directly with the specified laboratory maximum. The distractors result from reversing density ratios, confusing void ratio with porosity, treating percent as decimal, or dividing by the equivalency factor.

82. D — Using the stated data, void ratio is void volume divided by solids volume: 2.06/1.40 = 1.47. Therefore, the keyed value is the only option consistent with the governing relationship. Void ratio uses solids volume in the denominator, unlike porosity, which uses total volume. The distractors result from reversing density ratios, confusing void ratio with porosity, treating percent as decimal, or.

83. A — Using the stated data, daily loading is 2560 x 5.95 = 15232.00 ESAL. Therefore, the keyed value is the only option consistent with the governing relationship. Equivalent axle loading converts mixed truck repetitions into a common pavement-damage measure. The distractors result from reversing density ratios, confusing void ratio with porosity, treating percent as decimal, or dividing by the equivalency factor.

84. B — Using the stated data, dry unit weight is 293.00/(1+0.500) = 195.33 pcf. Therefore, the keyed value is the only option consistent with the governing relationship. Moist unit weight includes water mass, so dividing by one plus decimal water content isolates dry solids. The distractors result from reversing density ratios, confusing void ratio with porosity, treating percent as decimal, or dividing.

85. B — Using the stated data, relative compaction is 100(288.00/294.00) = 97.96%. Therefore, the keyed value is the only option consistent with the governing relationship. Relative compaction compares achieved field density directly with the specified laboratory maximum. The distractors result from reversing density ratios, confusing void ratio with porosity, treating percent as decimal, or dividing by the equivalency factor.

86. A — Using the stated data, void ratio is void volume divided by solids volume: 2.14/1.44 = 1.49. Therefore, the keyed value is the only option consistent with the governing relationship. Void ratio uses solids volume in the denominator, unlike porosity, which uses total volume. The distractors result from reversing density ratios, confusing void ratio with porosity, treating percent as decimal, or.

87. C — Using the stated data, daily loading is 2640 x 6.15 = 16236.00 ESAL. Therefore, the keyed value is the only option consistent with the governing relationship. Equivalent axle loading converts mixed truck repetitions into a common pavement-damage measure. The distractors result from reversing density ratios, confusing void ratio with porosity, treating percent as decimal, or dividing by the equivalency factor.

88. D — Using the stated data, dry unit weight is 301.00/(1+0.520) = 198.03 pcf. Therefore, the keyed value is the only option consistent with the governing relationship. Moist unit weight includes water mass, so dividing by one plus decimal water content isolates dry solids. The distractors result from reversing density ratios, confusing void ratio with porosity, treating percent as decimal, or dividing.

89. B — Using the stated data, Q = 1.45 x 11.20 x 98 = 1591.52 cubic feet per second. Therefore, the keyed value is the only option consistent with the governing relationship. With the customary rational-method convention, the product yields the design peak discharge for the contributing area. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter.

90. D — Using the stated data, area is pi(10.60)^2/4 = 88.25 square feet. Therefore, the keyed value is the only option consistent with the governing relationship. Circular area depends on the square of diameter, with the four arising from conversion between radius and diameter. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter instead of cross-sectional area.

91. A — Using the stated data, continuity gives velocity Q/A = 212.00/22.40 = 9.46 feet per second. Therefore, the keyed value is the only option consistent with the governing relationship. Mean velocity follows directly from discharge divided by the wetted flow area. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter instead of cross-sectional area.

92. C — Using the stated data, rectangular flow area is 91 x 9.80 = 891.80 square feet. Therefore, the keyed value is the only option consistent with the governing relationship. Under the stated simplification, flow area is the product of bottom width and water depth. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter instead of cross-sectional.

93. A — Using the stated data, Q = 1.49 x 11.60 x 102 = 1762.97 cubic feet per second. Therefore, the keyed value is the only option consistent with the governing relationship. With the customary rational-method convention, the product yields the design peak discharge for the contributing area. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter.

94. C — Using the stated data, area is pi(11.00)^2/4 = 95.03 square feet. Therefore, the keyed value is the only option consistent with the governing relationship. Circular area depends on the square of diameter, with the four arising from conversion between radius and diameter. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter instead of cross-sectional area.

95. D — Using the stated data, continuity gives velocity Q/A = 220.00/23.20 = 9.48 feet per second. Therefore, the keyed value is the only option consistent with the governing relationship. Mean velocity follows directly from discharge divided by the wetted flow area. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter instead of cross-sectional area.

96. B — Using the stated data, rectangular flow area is 95 x 10.20 = 969.00 square feet. Therefore, the keyed value is the only option consistent with the governing relationship. Under the stated simplification, flow area is the product of bottom width and water depth. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter instead of cross-sectional.

97. A — Using the stated data, Q = 1.53 x 12.00 x 106 = 1946.16 cubic feet per second. Therefore, the keyed value is the only option consistent with the governing relationship. With the customary rational-method convention, the product yields the design peak discharge for the contributing area. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter.

98. B — Using the stated data, area is pi(11.40)^2/4 = 102.07 square feet. Therefore, the keyed value is the only option consistent with the governing relationship. Circular area depends on the square of diameter, with the four arising from conversion between radius and diameter. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter instead of cross-sectional area.

99. D — Using the stated data, continuity gives velocity Q/A = 228.00/24.00 = 9.50 feet per second. Therefore, the keyed value is the only option consistent with the governing relationship. Mean velocity follows directly from discharge divided by the wetted flow area. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter instead of cross-sectional area.

100. C — Using the stated data, rectangular flow area is 99 x 10.60 = 1049.40 square feet. Therefore, the keyed value is the only option consistent with the governing relationship. Under the stated simplification, flow area is the product of bottom width and water depth. The distractors reflect radius-diameter confusion, inverted continuity, omitted runoff factors, or use of perimeter instead of cross-sectional.