

DESIGN RUNOFF LENGTHS (L_R) ①

E MAX = 0.04 DESIRABLE

| ③ e d (%) | V = 20 (MPH) | | | | | | V = 25 (MPH) | | | | | | V = 30 (MPH) | | | | | | V = 35 (MPH) | | | | | | V = 40 (MPH) | | | | | | V = 45 (MPH) | | | | | | V = 50 (MPH) | | | | | | V = 55 (MPH) | | | | | | V = 60 (MPH) | | | | | |
|-----------|--------------|-----------------|----|----|-----|-----|--------------|-----------------|----|-----|-----|-----|--------------|-----------------|----|-----|-----|-----|--------------|-----------------|----|-----|-----|-----|--------------|-----------------|-----|-----|-----|-----|--------------|-----------------|-----|-----|-----|-----|--------------|-----------------|-----|-----|-----|-----|--------------|-----------------|-----|-----|-----|-----|--------------|-----|-----|-----|-----|-----|
| | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | | | | | | |
| | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | 2 | 3 | 4 | 5 | 6 | |
| NC | 107 | 0 | 0 | 0 | 0 | 0 | 198 | 0 | 0 | 0 | 0 | 0 | 333 | 0 | 0 | 0 | 0 | 0 | 510 | 0 | 0 | 0 | 0 | 0 | 762 | 0 | 0 | 0 | 0 | 0 | 1039 | 0 | 0 | 0 | 0 | 0 | 7220 | 0 | 0 | 0 | 0 | 0 | 8650 | 0 | 0 | 0 | 0 | 0 | 10300 | 0 | 0 | 0 | 0 | 0 |
| 2 | 92 | 32 | 40 | 49 | 57 | 65 | 167 | 34 | 43 | 51 | 60 | 69 | 273 | 36 | 45 | 55 | 64 | 73 | 408 | 39 | 48 | 58 | 68 | 78 | 593 | 41 | 52 | 62 | 72 | 83 | 794 | 44 | 55 | 67 | 78 | 89 | 4940 | 48 | 60 | 72 | 84 | 96 | 5950 | 51 | 64 | 77 | 89 | 103 | 7080 | 53 | 66 | 80 | 93 | 107 |
| 2.2 | 91 | 36 | 44 | 54 | 62 | 72 | 165 | 38 | 47 | 57 | 66 | 76 | 270 | 40 | 50 | 60 | 70 | 80 | 404 | 43 | 53 | 64 | 75 | 86 | 586 | 46 | 57 | 68 | 80 | 91 | 785 | 49 | 61 | 73 | 86 | 98 | 4280 | 53 | 66 | 79 | 92 | 106 | 5180 | 56 | 70 | 84 | 98 | 113 | 6190 | 59 | 73 | 88 | 103 | 118 |
| 2.4 | 91 | 39 | 48 | 58 | 68 | 78 | 164 | 41 | 51 | 62 | 72 | 83 | 268 | 44 | 54 | 65 | 76 | 88 | 400 | 46 | 58 | 70 | 81 | 93 | 580 | 50 | 62 | 74 | 87 | 100 | 776 | 53 | 66 | 80 | 93 | 107 | 3690 | 58 | 72 | 86 | 101 | 116 | 4500 | 61 | 76 | 92 | 107 | 123 | 5410 | 64 | 80 | 96 | 112 | 129 |
| 2.6 | 90 | 42 | 52 | 63 | 74 | 85 | 163 | 45 | 55 | 67 | 78 | 90 | 265 | 47 | 59 | 71 | 83 | 95 | 396 | 50 | 63 | 75 | 88 | 101 | 573 | 54 | 67 | 81 | 94 | 108 | 767 | 58 | 72 | 87 | 101 | 116 | 3130 | 62 | 78 | 94 | 109 | 125 | 3870 | 66 | 83 | 100 | 116 | 133 | 4700 | 69 | 86 | 104 | 121 | 139 |
| 2.8 | 89 | 45 | 57 | 68 | 79 | 91 | 161 | 48 | 60 | 72 | 84 | 96 | 263 | 51 | 63 | 76 | 89 | 102 | 393 | 54 | 67 | 81 | 95 | 109 | 567 | 58 | 72 | 87 | 101 | 116 | 758 | 62 | 77 | 93 | 109 | 125 | 2660 | 67 | 84 | 101 | 118 | 135 | 3310 | 71 | 89 | 107 | 125 | 144 | 4060 | 75 | 93 | 112 | 131 | 150 |
| 3 | 89 | 49 | 61 | 73 | 85 | 98 | 160 | 51 | 64 | 77 | 90 | 103 | 261 | 55 | 68 | 82 | 95 | 110 | 389 | 58 | 72 | 87 | 102 | 117 | 561 | 62 | 77 | 93 | 109 | 125 | 750 | 67 | 83 | 100 | 117 | 134 | 2290 | 72 | 90 | 108 | 126 | 145 | 2860 | 77 | 95 | 115 | 134 | 154 | 3530 | 80 | 100 | 120 | 140 | 161 |
| 3.2 | 88 | 52 | 65 | 78 | 91 | 104 | 159 | 55 | 68 | 82 | 96 | 110 | 259 | 58 | 72 | 87 | 102 | 117 | 385 | 62 | 77 | 93 | 108 | 124 | 556 | 66 | 82 | 99 | 116 | 133 | 742 | 71 | 89 | 107 | 124 | 143 | 1980 | 77 | 96 | 115 | 134 | 154 | 2490 | 82 | 102 | 123 | 143 | 164 | 3090 | 85 | 106 | 128 | 149 | 172 |
| 3.4 | 88 | 55 | 69 | 83 | 96 | 111 | 158 | 58 | 73 | 87 | 102 | 117 | 256 | 62 | 77 | 93 | 108 | 124 | 382 | 66 | 82 | 99 | 115 | 132 | 550 | 70 | 88 | 106 | 123 | 141 | 734 | 76 | 94 | 113 | 132 | 152 | 1720 | 82 | 102 | 122 | 143 | 164 | 2170 | 87 | 108 | 130 | 152 | 174 | 2700 | 91 | 113 | 136 | 159 | 182 |
| 3.6 | 87 | 58 | 73 | 88 | 102 | 117 | 157 | 62 | 77 | 93 | 108 | 124 | 254 | 65 | 81 | 98 | 115 | 132 | 378 | 70 | 87 | 105 | 122 | 140 | 544 | 74 | 93 | 112 | 130 | 150 | 726 | 80 | 100 | 120 | 140 | 161 | 1480 | 86 | 108 | 130 | 151 | 174 | 1880 | 92 | 114 | 138 | 161 | 185 | 2350 | 96 | 120 | 144 | 168 | 193 |
| 3.8 | 87 | 62 | 77 | 92 | 108 | 124 | 155 | 65 | 81 | 98 | 114 | 131 | 252 | 69 | 86 | 104 | 121 | 139 | 375 | 74 | 92 | 110 | 129 | 148 | 539 | 79 | 98 | 118 | 138 | 158 | 718 | 84 | 105 | 127 | 148 | 170 | 1260 | 91 | 114 | 137 | 160 | 183 | 1600 | 97 | 121 | 146 | 170 | 195 | 2010 | 101 | 126 | 152 | 177 | 204 |
| 4 | 86 | 65 | 81 | 97 | 114 | 130 | 154 | 69 | 85 | 103 | 120 | 138 | 250 | 73 | 91 | 109 | 127 | 146 | 371 | 77 | 96 | 116 | 135 | 156 | 533 | 83 | 103 | 124 | 145 | 166 | 711 | 89 | 111 | 133 | 156 | 179 | 926 | 96 | 120 | 144 | 168 | 193 | 1190 | 102 | 127 | 153 | 179 | 205 | 1500 | 107 | 133 | 160 | 187 | 214 |

METHOD 2 ← → METHOD 5
④

E MAX = 0.06 ALLOWABLE

| ③ e d (%) | V = 20 (MPH) | | | | | | V = 25 (MPH) | | | | | | V = 30 (MPH) | | | | | | V = 35 (MPH) | | | | | | V = 40 (MPH) | | | | | | V = 45 (MPH) | | | | | | V = 50 (MPH) | | | | | | V = 55 (MPH) | | | | | | V = 60 (MPH) | | | | | |
|-----------|--------------|-----------------|----|-----|-----|-----|--------------|-----------------|----|-----|-----|-----|--------------|-----------------|-----|-----|-----|-----|--------------|-----------------|-----|-------|-----|-----|--------------|-----------------|-----|-----|-----|-----|--------------|-----------------|-----|-----|-----|-----|--------------|-----------------|-----|-----|-----|-----|--------------|-----------------|-----|-----|-----|-----|--------------|-----|-----|-----|-----|-----|
| | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | R MIN. (FT.) | Number of Lanes | | | | | | | | | | |
| | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 | 2 | 3 | 4 | 5 | 6 | |
| NC | 107 | 0 | 0 | 0 | 0 | 0 | 198 | 0 | 0 | 0 | 0 | 0 | 333 | 0 | 0 | 0 | 0 | 0 | 510 | 0 | 0 | 0 | 0 | 0 | 762 | 0 | 0 | 0 | 0 | 0 | 1039 | 0 | 0 | 0 | 0 | 0 | 7870 | 0 | 0 | 0 | 0 | 0 | 9410 | 0 | 0 | 0 | 0 | 0 | 11100 | 0 | 0 | 0 | 0 | 0 |
| 2 | 92 | 32 | 40 | 49 | 57 | 65 | 167 | 34 | 43 | 51 | 60 | 69 | 273 | 36 | 45 | 55 | 64 | 73 | 408 | 39 | 48 | 58 | 68 | 78 | 593 | 41 | 52 | 62 | 72 | 83 | 794 | 44 | 55 | 67 | 78 | 89 | 5700 | 48 | 60 | 72 | 84 | 96 | 6820 | 51 | 64 | 77 | 89 | 103 | 8060 | 53 | 66 | 80 | 93 | 107 |
| 2.2 | 91 | 36 | 44 | 54 | 62 | 72 | 165 | 38 | 47 | 57 | 66 | 76 | 270 | 40 | 50 | 60 | 70 | 80 | 404 | 43 | 53 | 64 | 75 | 86 | 586 | 46 | 57 | 68 | 80 | 91 | 785 | 49 | 61 | 73 | 86 | 98 | 5100 | 53 | 66 | 79 | 92 | 106 | 6110 | 56 | 70 | 84 | 98 | 113 | 7230 | 59 | 73 | 88 | 103 | 118 |
| 2.4 | 91 | 39 | 48 | 58 | 68 | 78 | 164 | 41 | 51 | 62 | 72 | 83 | 268 | 44 | 54 | 65 | 76 | 88 | 400 | 46 | 58 | 70 | 81 | 93 | 580 | 50 | 62 | 74 | 87 | 100 | 776 | 53 | 66 | 80 | 93 | 107 | 4600 | 58 | 72 | 86 | 101 | 116 | 5520 | 61 | 76 | 92 | 107 | 123 | 6540 | 64 | 80 | 96 | 112 | 129 |
| 2.6 | 90 | 42 | 52 | 63 | 74 | 85 | 163 | 45 | 55 | 67 | 78 | 90 | 265 | 47 | 59 | 71 | 83 | 95 | 396 | 50 | 63 | 75 | 88 | 101 | 573 | 54 | 67 | 81 | 94 | 108 | 767 | 58 | 72 | 87 | 101 | 116 | 4170 | 62 | 78 | 94 | 109 | 125 | 5020 | 66 | 83 | 100 | 116 | 133 | 5950 | 69 | 86 | 104 | 121 | 139 |
| 2.8 | 89 | 45 | 57 | 68 | 79 | 91 | 161 | 48 | 60 | 72 | 84 | 96 | 263 | 51 | 63 | 76 | 89 | 102 | 393 | 54 | 67 | 81 | 95 | 109 | 567 | 58 | 72 | 87 | 101 | 116 | 758 | 62 | 77 | 93 | 109 | 125 | 3800 | 67 | 84 | 101 | 118 | 135 | 4580 | 71 | 89 | 107 | 125 | 144 | 5440 | 75 | 93 | 112 | 131 | 150 |
| 3 | 89 | 49 | 61 | 73 | 85 | 98 | 160 | 51 | 64 | 77 | 90 | 103 | 261 | 55 | 68 | 82 | 95 | 110 | 389 | 58 | 72 | 87 | 102 | 117 | 561 | 62 | 77 | 93 | 109 | 125 | 750 | 67 | 83 | 100 | 117 | 134 | 3480 | 72 | 90 | 108 | 126 | 145 | 4200 | 77 | 95 | 115 | 134 | 154 | 4990 | 80 | 100 | 120 | 140 | 161 |
| 3.2 | 88 | 52 | 65 | 78 | 91 | 104 | 159 | 55 | 68 | 82 | 96 | 110 | 259 | 58 | 72 | 87 | 102 | 117 | 385 | 62 | 77 | 93 | 108 | 124 | 556 | 66 | 82 | 99 | 116 | 133 | 742 | 71 | 89 | 107 | 124 | 143 | 3200 | 77 | 96 | 115 | 134 | 154 | 3860 | 82 | 102 | 123 | 143 | 164 | 4600 | 85 | 106 | 128 | 149 | 172 |
| 3.4 | 88 | 55 | 69 | 83 | 96 | 111 | 158 | 58 | 73 | 87 | 102 | 117 | 256 | 62 | 77 | 93 | 108 | 124 | 382 | 66 | 82 | 99 | 115 | 132 | 550 | 70 | 88 | 106 | 123 | 141 | 734 | 76 | 94 | 113 | 132 | 152 | 2940 | 82 | 102 | 122 | 143 | 164 | 3560 | 87 | 108 | 130 | 152 | 174 | 4250 | 91 | 113 | 136 | 159 | 182 |
| 3.6 | 87 | 58 | 73 | 88 | 102 | 117 | 157 | 62 | 77 | 93 | 108 | 124 | 254 | 65 | 81 | 98 | 115 | 132 | 378 | 70 | 87 | 105 | 122 | 140 | 544 | 74 | 93 | 112 | 130 | 150 | 726 | 80 | 100 | 120 | 140 | 161 | 2710 | 86 | 108 | 130 | 151 | 174 | 3290 | 92 | 114 | 138 | 161 | 185 | 3940 | 96 | 120 | 144 | 168 | 193 |
| 3.8 | 87 | 62 | 77 | 92 | 108 | 124 | 155 | 65 | 81 | 98 | 114 | 131 | 252 | 69 | 86 | 104 | 121 | 139 | 375 | 74 | 92 | 110 | 129 | 148 | 539 | 79 | 98 | 118 | 138 | 158 | 718 | 84 | 105 | 127 | 148 | 170 | 2490 | 91 | 114 | 137 | 160 | 183 | 3040 | 97 | 121 | 146 | 170 | 195 | 3650 | 101 | 126 | 152 | 177 | 204 |
| 4 | 86 | 65 | 81 | 97 | 114 | 130 | 154 | 69 | 85 | 103 | 120 | 138 | 250 | 73 | 91 | 109 | 127 | 146 | 371 | 77 | 96 | 116 | 135 | 156 | 533 | 83 | 103 | 124 | 145 | 166 | 711 | 89 | 111 | 133 | 156 | 179 | 2300 | 96 | 120 | 144 | 168 | 193 | 2810 | 102 | 127 | 153 | 179 | 205 | 3390 | 107 | 133 | 160 | 187 | 214 |
| 4.2 | 85 | 68 | 85 | 102 | 119 | 137 | 153 | 72 | 90 | 108 | 126 | 145 | 248 | 76 | 95 | 115 | 134 | 153 | 368 | 81 | 101 | 122 | 142 | 163 | 528 | 87 | 108 | 130 | 152 | 175 | 703 | 93 | 116 | 140 | 163 | 188 | 2110 | 101 | 125 | 151 | 176 | 203 | 2590 | 107 | 134 | 161 | 188 | 216 | 3140 | 112 | 139 | 168 | 196 | 225 |
| 4.4 | 85 | 71 | 89 | 107 | 125 | 143 | 152 | 75 | 94 | 113 | 132 | 152 | 246 | 80 | 100 | 120 | 140 | 161 | 365 | 85 | 106 | 128</ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |