

## Shortest Path - Calculations

In this document we present our calculation of speed limit, ideal time, and difference for each traffic condition for modeling.

### 1 Green.

$$\begin{aligned}1. \mathcal{D} &= 3168 \text{ ft} \\ \mathcal{S} &= 35 \text{ mph} = 3080 \text{ ft/min} \\ \mathcal{I} &= \frac{3168 \text{ ft}}{3080 \text{ ft/min}} = 1.02857 \text{ min} \\ \mathcal{F} &= 4 - 1.02857 \text{ min} = 2.9714 \text{ min}\end{aligned}$$

$$\begin{aligned}2. \mathcal{D} &= 5808 \text{ ft} \\ \mathcal{S} &= 25 \text{ mph} = 2200 \text{ ft/min} \\ \mathcal{I} &= \frac{5808 \text{ ft}}{2200 \text{ ft/min}} = 2.64 \text{ min} \\ \mathcal{F} &= 5 - 2.64 \text{ min} = 2.36 \text{ min}\end{aligned}$$

$$\begin{aligned}3. \mathcal{D} &= 2640 \text{ ft} \\ \mathcal{S} &= 35 \text{ mph} = 3080 \text{ ft/min} \\ \mathcal{I} &= \frac{2640 \text{ ft}}{3080 \text{ ft/min}} = .85714 \text{ min} \\ \mathcal{F} &= 3 - .85714 \text{ min} = 2.1429 \text{ min}\end{aligned}$$

$$\begin{aligned}4. \mathcal{D} &= 11088 \text{ ft} \\ \mathcal{S} &= 45 \text{ mph} = 3960 \text{ ft/min} \\ \mathcal{I} &= \frac{11088 \text{ ft}}{3960 \text{ ft/min}} = 2.8 \text{ min} \\ \mathcal{F} &= 4 - 2.8 \text{ min} = 1.2 \text{ min}\end{aligned}$$

$$\begin{aligned}5. \mathcal{D} &= 3996 \text{ ft} \\ \mathcal{S} &= 30 \text{ mph} = 2640 \text{ ft/min} \\ \mathcal{I} &= \frac{3996 \text{ ft}}{2640 \text{ ft/min}} = 1.5136364 \text{ min} \\ \mathcal{F} &= 3 - 1.5136364 \text{ min} = 1.4863636 \text{ min}\end{aligned}$$

$$\begin{aligned}6. \mathcal{D} &= 2640 \text{ ft} \\ \mathcal{S} &= 35 \text{ mph} = 3080 \text{ ft/min} \\ \mathcal{I} &= \frac{2640 \text{ ft}}{3080 \text{ ft/min}} = .85714 \text{ min} \\ \mathcal{F} &= 2 - .85714 \text{ min} = 1.1429 \text{ min}\end{aligned}$$

$$\begin{aligned}7. \mathcal{D} &= 2112 \text{ ft} \\ \mathcal{S} &= 25 \text{ mph} = 2200 \text{ ft/min} \\ \mathcal{I} &= \frac{2112 \text{ ft}}{2200 \text{ ft/min}} = .96 \text{ min} \\ \mathcal{F} &= 2 - .96 \text{ min} = 1.04 \text{ min}\end{aligned}$$

$$\begin{aligned}8. \mathcal{D} &= 2112 \text{ ft} \\ \mathcal{S} &= 20 \text{ mph} = 1760 \text{ ft/min} \\ \mathcal{I} &= \frac{2112 \text{ ft}}{1760 \text{ ft/min}} = 1.2 \text{ min}\end{aligned}$$

$$\mathcal{F} = 2 - 1.2 \text{ min} = .8 \text{ min}$$

$$\mathbf{9.} \quad \mathcal{D} = 3168 \text{ ft}$$

$$\mathcal{S} = 20 \text{ mph} = 1760 \text{ ft/min}$$

$$\mathcal{I} = \frac{3168 \text{ ft}}{1760 \text{ ft/min}} = 1.8 \text{ min}$$

$$\mathcal{F} = 3 - 1.8 \text{ min} = 1.2 \text{ min}$$

$$\mathbf{10.} \quad \mathcal{D} = 5808 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{5808 \text{ ft}}{3080 \text{ ft/min}} = 1.885714 \text{ min}$$

$$\mathcal{F} = 3 - 1.885714 \text{ min} = 1.1142857 \text{ min}$$

$$\mathbf{11.} \quad \mathcal{D} = 70752 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{70752 \text{ ft}}{5720 \text{ ft/min}} = 12.36923 \text{ min}$$

$$\mathcal{F} = 15 - 12.36923 \text{ min} = 2.630769 \text{ min}$$

$$\mathbf{12.} \quad \mathcal{D} = 28512 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{28512 \text{ ft}}{5720 \text{ ft/min}} = 4.984615 \text{ min}$$

$$\mathcal{F} = 6 - 4.984615 \text{ min} = 1.015385 \text{ min}$$

$$\mathbf{13.} \quad \mathcal{D} = 17424 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{17424 \text{ ft}}{5720 \text{ ft/min}} = 3.04615 \text{ min}$$

$$\mathcal{F} = 4 - 3.04615 \text{ min} = .95385 \text{ min}$$

$$\mathbf{14.} \quad \mathcal{D} = 31680 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{31680 \text{ ft}}{4840 \text{ ft/min}} = 6.5454545 \text{ min}$$

$$\mathcal{F} = 7 - 6.5454545 \text{ min} = .45454545 \text{ min}$$

$$\mathbf{15.} \quad \mathcal{D} = 12144 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{12144 \text{ ft}}{4840 \text{ ft/min}} = 2.5090909 \text{ min}$$

$$\mathcal{F} = 3 - 2.5090909 \text{ min} = .49090909 \text{ min}$$

$$\mathbf{16.} \quad \mathcal{D} = 5280 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{5280 \text{ ft}}{3080 \text{ ft/min}} = 1.714286 \text{ min}$$

$$\mathcal{F} = 3 - 1.714286 \text{ min} = 1.285714 \text{ min}$$

$$\mathbf{17.} \quad \mathcal{D} = 7392 \text{ ft}$$

$$\mathcal{D}_1 = 2640 \text{ ft}$$

$$\mathcal{S}_1 = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\begin{aligned}
\mathcal{I}_1 &= \frac{2640 ft}{3080 ft/min} = .85714 \text{ min} \\
\mathcal{D}_2 &= 4752 \text{ ft} \\
\mathcal{S}_2 &= 45 \text{ mph} = 3960 \text{ ft/min} \\
\mathcal{I}_2 &= \frac{4752 ft}{3960 ft/min} = 1.2 \text{ min} \\
\mathcal{I} &= \mathcal{I}_1 + \mathcal{I}_2 = 2.05714 \text{ min} \quad \mathcal{F} = 3 - 2.05714 \text{ min} = .94286 \text{ min}
\end{aligned}$$

$$\begin{aligned}
\text{18. } \mathcal{D} &= 23760 \text{ ft} \\
\mathcal{D}_1 &= 6864 \text{ ft} \quad \mathcal{S}_1 = 45 \text{ mph} = 3960 \text{ ft/min} \\
\mathcal{I}_1 &= \frac{6864 ft}{3960 ft/min} = 1.7333 \text{ min} \quad \mathcal{D}_2 = 1056 \text{ ft} \quad \mathcal{S}_2 = 35 \text{ mph} = 3080 \text{ ft/min} \\
\mathcal{I}_2 &= \frac{1056 ft}{3080 ft/min} = .34286 \text{ min} \quad \mathcal{D}_3 = 9504 \text{ ft} \quad \mathcal{S}_3 = 45 \text{ mph} = 3960 \text{ ft/min} \\
\mathcal{I}_3 &= \frac{1056 ft}{3960 ft/min} = 2.4 \text{ min} \quad \mathcal{D}_4 = 6336 \text{ ft} \quad \mathcal{S}_4 = 55 \text{ mph} = 4840 \text{ ft/min} \\
\mathcal{I}_4 &= \frac{6336 ft}{4840 ft/min} = 1.30909 \text{ min} \quad \mathcal{I} = \mathcal{I}_1 + \mathcal{I}_2 + \mathcal{I}_3 + \mathcal{I}_4 = 1.733 + .34286 + 2.4 + 1.30909 = 5.7852813 \text{ min} \\
\mathcal{F} &= 6 - 5.7852813 \text{ min} = .214719 \text{ min}
\end{aligned}$$

$$\begin{aligned}
\text{19. } \mathcal{D} &= 14256 \text{ ft} \\
\mathcal{S} &= 35 \text{ mph} = 3080 \text{ ft/min} \\
\mathcal{I} &= \frac{14256 ft}{3080 ft/min} = 4.62857 \text{ min} \\
\mathcal{F} &= 5 - 4.62857 \text{ min} = .37142 \text{ min}
\end{aligned}$$

$$\begin{aligned}
\text{20. } \mathcal{D} &= 27984 \text{ ft} \\
\mathcal{S} &= 55 \text{ mph} = 4840 \text{ ft/min} \\
\mathcal{I} &= \frac{27984 ft}{4840 ft/min} = 5.7818 \text{ min} \\
\mathcal{F} &= 6 - 5.7818 \text{ min} = .2182 \text{ min}
\end{aligned}$$

$$\begin{aligned}
\text{21. } \mathcal{D} &= 5280 \text{ ft} \\
\mathcal{S} &= 35 \text{ mph} = 3080 \text{ ft/min} \\
\mathcal{I} &= \frac{5280 ft}{3080 ft/min} = 1.714286 \text{ min} \\
\mathcal{F} &= 3 - 1.714286 \text{ min} = 1.285714 \text{ min}
\end{aligned}$$

$$\begin{aligned}
\text{22. } \mathcal{D} &= 5280 \text{ ft} \\
\mathcal{S} &= 25 \text{ mph} = 2200 \text{ ft/min} \\
\mathcal{I} &= \frac{5280 ft}{2200 ft/min} = 2.4 \text{ min} \\
\mathcal{F} &= 3 - 2.4 \text{ min} = .6 \text{ min}
\end{aligned}$$

$$\begin{aligned}
\text{23. } \mathcal{D} &= 3168 \text{ ft} \\
\mathcal{S} &= 30 \text{ mph} = 2640 \text{ ft/min} \\
\mathcal{I} &= \frac{3168 ft}{2640 ft/min} = 1.2 \text{ min} \\
\mathcal{F} &= 2 - 1.2 \text{ min} = .8 \text{ min}
\end{aligned}$$

$$\begin{aligned}
\text{24. } \mathcal{D} &= 57024 \text{ ft} \\
\mathcal{S} &= 55 \text{ mph} = 4840 \text{ ft/min} \\
\mathcal{I} &= \frac{57024 ft}{4840 ft/min} = 11.781818 \text{ min} \\
\mathcal{F} &= 12 - 11.781818 \text{ min} = .218182 \text{ min}
\end{aligned}$$

**25.**  $\mathcal{D} = 2112$  ft  
 $\mathcal{S} = 25$  mph = 2200 ft/min  
 $\mathcal{I} = \frac{2112ft}{2200ft/min} = .96$  min  
 $\mathcal{F} = 2 - .96$  min = .04 min

**26.**  $\mathcal{D} = 4752$  ft  
 $\mathcal{S} = 30$  mph = 2640 ft/min  
 $\mathcal{I} = \frac{4752ft}{2640ft/min} = 1.8$  min  
 $\mathcal{F} = 4 - 1.8$  min = 2.2 min

**27.**  $\mathcal{D} = 7920$  ft  
 $\mathcal{S} = 35$  mph = 3080 ft/min  
 $\mathcal{I} = \frac{7920ft}{3080ft/min} = 2.57143$  min  
 $\mathcal{F} = 5 - 2.57143$  min = 2.42857 min

**28.**  $\mathcal{D} = 4752$  ft  
 $\mathcal{S} = 35$  mph = 3080 ft/min  
 $\mathcal{I} = \frac{4752ft}{3080ft/min} = 1.5429$  min  
 $\mathcal{F} = 4 - 1.5429$  min = 2.4571 min

**29.**  $\mathcal{D} = 3168$  ft  
 $\mathcal{S} = 20$  mph = 1760 ft/min  
 $\mathcal{I} = \frac{3168ft}{1760ft/min} = 1.8$  min  
 $\mathcal{F} = 2 - 1.8$  min = .2 min

**30.**  $\mathcal{D} = 7920$  ft  
 $\mathcal{S} = 35$  mph = 3080 ft/min  
 $\mathcal{I} = \frac{7920ft}{3080ft/min} = 2.5714$  min  
 $\mathcal{F} = 5 - 2.5714$  min = 2.4286 min

**31.**  $\mathcal{D} = 11616$  ft  
 $\mathcal{S} = 35$  mph = 3080 ft/min  
 $\mathcal{I} = \frac{11616ft}{3080ft/min} = 3.7714$  min  
 $\mathcal{F} = 8 - 3.7714$  min = 4.2286 min

**32.**  $\mathcal{D} = 3696$  ft  
 $\mathcal{S} = 30$  mph = 2640 ft/min  
 $\mathcal{I} = \frac{3696ft}{2640ft/min} = 1.4$  min  
 $\mathcal{F} = 3 - 1.4$  min = 1.6 min

## 2 Orange.

1.  $\mathcal{D} = 3686$  ft  
 $\mathcal{S} = 35$  mph = 3080 ft/min  
 $\mathcal{I} = \frac{3686 ft}{3080 ft/min} = 1.196753$  min  
 $\mathcal{F} = 5 - 1.196753$  min = 3.80324675 min

2.  $\mathcal{D} = 1584$  ft  
 $\mathcal{S} = 30$  mph = 2640 ft/min  
 $\mathcal{I} = \frac{1584 ft}{2640 ft/min} = 0.6$  min  
 $\mathcal{F} = 3 - 0.6$  min = 2.4 min

3.  $\mathcal{D} = 4752$  ft  
 $\mathcal{S} = 25$  mph = 2200 ft/min  
 $\mathcal{I} = \frac{4752 ft}{2200 ft/min} = 2.16$  min  
 $\mathcal{F} = 7 - 2.16$  min = 4.84 min

4.  $\mathcal{D} = 5280$  ft  
 $\mathcal{S} = 25$  mph = 2200 ft/min  
 $\mathcal{I} = \frac{5280 ft}{2200 ft/min} = 2.4$  min  
 $\mathcal{F} = 5 - 2.4$  min = 2.6 min

5.  $\mathcal{D} = 2640$  ft  
 $\mathcal{S} = 20$  mph = 1760 ft/min  
 $\mathcal{I} = \frac{2640 ft}{1760 ft/min} = 1.5$  min  
 $\mathcal{F} = 3 - 1.5$  min = 1.5 min

6.  $\mathcal{D} = 3168$  ft  
 $\mathcal{S} = 35$  mph = 3080 ft/min  
 $\mathcal{I} = \frac{3168 ft}{3080 ft/min} = 1.028571$  min  
 $\mathcal{F} = 3 - 1.028571$  min = 1.971429 min

7.  $\mathcal{D} = 2112$  ft  
 $\mathcal{S} = 35$  mph = 3080 ft/min  
 $\mathcal{I} = \frac{2112 ft}{3080 ft/min} = 0.6857143$  min  
 $\mathcal{F} = 3 - .6857143$  min = 2.314286 min

8.  $\mathcal{D} = 2640$  ft  
 $\mathcal{S} = 20$  mph = 1760 ft/min  
 $\mathcal{I} = \frac{2640 ft}{1760 ft/min} = 1.5$  min  
 $\mathcal{F} = 3 - 1.5$  min = 1.5 min

9.  $\mathcal{D} = 2112$  ft  
 $\mathcal{S} = 20$  mph = 1760 ft/min  
 $\mathcal{I} = \frac{2112 ft}{1760 ft/min} = 1.5$  min

$$\mathcal{F} = 3 - 1.5 \text{ min} = 1.5 \text{ min}$$

$$10. \mathcal{D} = 2112 \text{ ft}$$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{2112 \text{ ft}}{2200 \text{ ft/min}} = .96 \text{ min}$$

$$\mathcal{F} = 3 - .96 \text{ min} = 2.04 \text{ min}$$

$$11. \mathcal{D} = 4224 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{4224 \text{ ft}}{3080 \text{ ft/min}} = 1.371 \text{ min}$$

$$\mathcal{F} = 3 - 1.371 \text{ min} = 1.629 \text{ min}$$

$$12. \mathcal{D} = 4752 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{4752 \text{ ft}}{3080 \text{ ft/min}} = 1.54 \text{ min}$$

$$\mathcal{F} = 6 - 1.54 \text{ min} = 4.46 \text{ min}$$

$$13. \mathcal{D} = 18480 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{18480 \text{ ft}}{5720 \text{ ft/min}} = 3.231 \text{ min}$$

$$\mathcal{F} = 6 - 3.231 \text{ min} = 2.769 \text{ min}$$

$$14. \mathcal{D} = 7392 \text{ ft}$$

$$\mathcal{S} = 40 \text{ mph} = 3520 \text{ ft/min}$$

$$\mathcal{I} = \frac{7392 \text{ ft}}{3520 \text{ ft/min}} = 2.1 \text{ min}$$

$$\mathcal{F} = 7 - 2.1 \text{ min} = 4.9 \text{ min}$$

$$15. \mathcal{D} = 5280 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{5280 \text{ ft}}{3080 \text{ ft/min}} = 1.71 \text{ min}$$

$$\mathcal{F} = 4 - 1.71 \text{ min} = 2.29 \text{ min}$$

$$16. \mathcal{D} = 24288 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{24288 \text{ ft}}{5720 \text{ ft/min}} = 4.246 \text{ min}$$

$$\mathcal{F} = 8 - 4.246 \text{ min} = 3.754 \text{ min}$$

$$17. \mathcal{D} = 79100 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{79100 \text{ ft}}{5720 \text{ ft/min}} = 13.829 \text{ min}$$

$$\mathcal{F} = 24 - 13.829 \text{ min} = 10.171 \text{ min}$$

$$18. \mathcal{D} = 7392 \text{ ft}$$

$$\mathcal{S} = 40 \text{ mph} = 3520 \text{ ft/min}$$

$$\mathcal{I} = \frac{7392 \text{ ft}}{3520 \text{ ft/min}} = 2.1 \text{ min}$$

$$\mathcal{F} = 6 - 2.1 \text{ min} = 3.9 \text{ min}$$

$$\mathbf{19.} \quad \mathcal{D} = 2112 \text{ ft}$$

$$\mathcal{S} = 25 \text{ mph} = 3520 \text{ ft/min}$$

$$\mathcal{I} = \frac{2112 \text{ ft}}{3520 \text{ ft/min}} = .6 \text{ min}$$

$$\mathcal{F} = 3 - .6 \text{ min} = 2.4 \text{ min}$$

$$\mathbf{20.} \quad \mathcal{D} = 2112 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{2112 \text{ ft}}{3080 \text{ ft/min}} = .6857 \text{ min}$$

$$\mathcal{F} = 2 - .6857 \text{ min} = 1.314 \text{ min}$$

$$\mathbf{21.} \quad \mathcal{D} = 3168 \text{ ft}$$

$$\mathcal{S} = 25 \text{ mph} = 3520 \text{ ft/min}$$

$$\mathcal{I} = \frac{3168 \text{ ft}}{3520 \text{ ft/min}} = 0.9 \text{ min}$$

$$\mathcal{F} = 4 - .9 \text{ min} = 3.1 \text{ min}$$

$$\mathbf{22.} \quad \mathcal{D} = 4224 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{4224 \text{ ft}}{3080 \text{ ft/min}} = 1.371 \text{ min}$$

$$\mathcal{F} = 6 - 1.371 \text{ min} = 4.629 \text{ min}$$

$$\mathbf{23.} \quad \mathcal{D} = 2640 \text{ ft}$$

$$\mathcal{S} = 20 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{2640 \text{ ft}}{2200 \text{ ft/min}} = 1.2 \text{ min}$$

$$\mathcal{F} = 3 - 1.2 \text{ min} = 1.8 \text{ min}$$

$$\mathbf{24.} \quad \mathcal{D} = 2112 \text{ ft}$$

$$\mathcal{S} = 20 \text{ mph} = 1760 \text{ ft/min}$$

$$\mathcal{I} = \frac{2112 \text{ ft}}{2200 \text{ ft/min}} = .96 \text{ min}$$

$$\mathcal{F} = 2 - .96 \text{ min} = 1.04 \text{ min}$$

$$\mathbf{25.} \quad \mathcal{D} = 5808 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{5808 \text{ ft}}{3080 \text{ ft/min}} = 1.886 \text{ min}$$

$$\mathcal{F} = 8 - 1.886 \text{ min} = 6.114 \text{ min}$$

$$\mathbf{26.} \quad \mathcal{D} = 2640 \text{ ft}$$

$$\mathcal{S} = 30 \text{ mph} = 2640 \text{ ft/min}$$

$$\mathcal{I} = \frac{2640 \text{ ft}}{2640 \text{ ft/min}} = 1 \text{ min}$$

$$\mathcal{F} = 5 - 1 \text{ min} = 4 \text{ min}$$

$$\mathbf{27.} \quad \mathcal{D} = 2640 \text{ ft}$$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{2640 \text{ ft}}{2200 \text{ ft/min}} = 1.2 \text{ min}$$

$$\mathcal{F} = 5 - 1.2 \text{ min} = 3.8 \text{ min}$$

$$\mathbf{28.} \quad \mathcal{D} = 2112 \text{ ft}$$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{2112 \text{ ft}}{2200 \text{ ft/min}} = .96 \text{ min}$$

$$\mathcal{F} = 5 - .96 \text{ min} = 4.04 \text{ min}$$

$$\mathbf{29.} \quad \mathcal{D} = 1584 \text{ ft}$$

$$\mathcal{S} = 20 \text{ mph} = 1760 \text{ ft/min}$$

$$\mathcal{I} = \frac{1584 \text{ ft}}{1760 \text{ ft/min}} = .9 \text{ min}$$

$$\mathcal{F} = 2 - .9 \text{ min} = 1.1 \text{ min}$$

$$\mathbf{30.} \quad \mathcal{D} = 2112 \text{ ft}$$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{2112 \text{ ft}}{2200 \text{ ft/min}} = .96 \text{ min}$$

$$\mathcal{F} = 2 - .96 \text{ min} = 1.04 \text{ min}$$

### 3 Red.

$$\mathbf{1.} \quad \mathcal{D} = 528 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{528 \text{ ft}}{3080 \text{ ft/min}} = .1714286 \text{ min}$$

$$\mathcal{F} = 2 - .1714286 \text{ min} = 1.82857 \text{ min}$$

$$\mathbf{2.} \quad \mathcal{D} = 1056 \text{ ft}$$

$$\mathcal{S} = 20 \text{ mph} = 1760 \text{ ft/min}$$

$$\mathcal{I} = \frac{1056 \text{ ft}}{1760 \text{ ft/min}} = .6 \text{ min}$$

$$\mathcal{F} = 2 - .6 \text{ min} = 1.4 \text{ min}$$

$$\mathbf{3.} \quad \mathcal{D} = 1056 \text{ ft}$$

$$\mathcal{S} = 20 \text{ mph} = 1760 \text{ ft/min}$$

$$\mathcal{I} = \frac{1056 \text{ ft}}{1760 \text{ ft/min}} = .1714286 \text{ min}$$

$$\mathcal{F} = 2 - .6 \text{ min} = 1.4 \text{ min}$$

$$\mathbf{4.} \quad \mathcal{D} = 1056 \text{ ft}$$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{1056 \text{ ft}}{2200 \text{ ft/min}} = .48 \text{ min}$$

$$\mathcal{F} = 2 - .48 \text{ min} = 1.52 \text{ min}$$

$$\mathbf{5.} \quad \mathcal{D} = 13728 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{13728 \text{ ft}}{5720 \text{ ft/min}} = 2.4 \text{ min}$$



$$\mathcal{F} = 9 - 2.4 \text{ min} = 6.6 \text{ min}$$

$$\mathbf{6.} \quad \mathcal{D} = 3168 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{3168 ft}{5720 ft/min} = .5538461 \text{ min}$$

$$\mathcal{F} = 2 - .5538461 \text{ min} = 1.44615 \text{ min}$$

$$\mathbf{7.} \quad \mathcal{D} = 2640 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{2640 ft}{5720 ft/min} = .4615384 \text{ min}$$

$$\mathcal{F} = 2 - .4615384 \text{ min} = 1.5384615 \text{ min}$$

$$\mathbf{8.} \quad \mathcal{D} = 6864 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{6864 ft}{5720 ft/min} = 1.2 \text{ min}$$

$$\mathcal{F} = 4 - 1.2 \text{ min} = 2.8 \text{ min}$$

$$\mathbf{9.} \quad \mathcal{D} = 3696 \text{ ft}$$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{3696 ft}{3080 ft/min} = 1.2 \text{ min}$$

$$\mathcal{F} = 3 - 1.2 \text{ min} = 1.8 \text{ min}$$

$$\mathbf{10.} \quad \mathcal{D} = 23760 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{23760 ft}{5720 ft/min} = 4.1538 \text{ min}$$

$$\mathcal{F} = 12 - 4.1538 \text{ min} = 7.8462 \text{ min}$$

$$\mathbf{11.} \quad \mathcal{D} = 17424 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{17424 ft}{5720 ft/min} = 3.0462 \text{ min}$$

$$\mathcal{F} = 13 - 3.0462 \text{ min} = 9.9538 \text{ min}$$

$$\mathbf{12.} \quad \mathcal{D} = 2112 \text{ ft}$$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{2112 ft}{2200 ft/min} = .96 \text{ min}$$

$$\mathcal{F} = 2 - .96 \text{ min} = 1.04 \text{ min}$$

$$\mathbf{13.} \quad \mathcal{D} = 1584 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{1584 ft}{5720 ft/min} = .2769 \text{ min}$$

$$\mathcal{F} = 1 - .2769 \text{ min} = .7231 \text{ min}$$

$$\mathbf{14.} \quad \mathcal{D} = 528 \text{ ft}$$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{528 ft}{2200 ft/min} = .24 \text{ min}$$

$$\mathcal{F} = 1 - .24 \text{ min} = .76 \text{ min}$$

**15.**  $\mathcal{D} = 328 \text{ ft}$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{328 \text{ ft}}{2200 \text{ ft/min}} = .1491 \text{ min}$$

$$\mathcal{F} = 1 - .1491 \text{ min} = .8509 \text{ min}$$

**16.**  $\mathcal{D} = 528 \text{ ft}$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{528 \text{ ft}}{2200 \text{ ft/min}} = .24 \text{ min}$$

$$\mathcal{F} = 2 - .24 \text{ min} = 1.76 \text{ min}$$

**17.**  $\mathcal{D} = 6864 \text{ ft}$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{6864 \text{ ft}}{5720 \text{ ft/min}} = 1.2 \text{ min}$$

$$\mathcal{F} = 5 - 1.2 \text{ min} = 3.8 \text{ min}$$

**18.**  $\mathcal{D} = 2112 \text{ ft}$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{2112 \text{ ft}}{3080 \text{ ft/min}} = .686 \text{ min}$$

$$\mathcal{F} = 3 - .686 \text{ min} = 2.314 \text{ min}$$

**19.**  $\mathcal{D} = 528 \text{ ft}$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{528 \text{ ft}}{2200 \text{ ft/min}} = .24 \text{ min}$$

$$\mathcal{F} = 2 - .24 \text{ min} = 1.76 \text{ min}$$

**20.**  $\mathcal{D} = 3168 \text{ ft}$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{3168 \text{ ft}}{5720 \text{ ft/min}} = .5538 \text{ min}$$

$$\mathcal{F} = 2 - .5538 \text{ min} = .4462 \text{ min}$$

**21.**  $\mathcal{D} = 36960 \text{ ft}$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{36960 \text{ ft}}{5720 \text{ ft/min}} = 6.4615 \text{ min}$$

$$\mathcal{F} = 18 - 6.4615 \text{ min} = 11.5385 \text{ min}$$

**22.**  $\mathcal{D} = 8448 \text{ ft}$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{8448 \text{ ft}}{5720 \text{ ft/min}} = 1.4769 \text{ min}$$

$$\mathcal{F} = 6 - 1.4769 \text{ min} = 4.5231 \text{ min}$$

**23.**  $\mathcal{D} = 5280 \text{ ft}$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{5280 \text{ ft}}{4840 \text{ ft/min}} = 1.0909 \text{ min}$$

$$\mathcal{F} = 4 - 1.0909 \text{ min} = 3.9091 \text{ min}$$

$$\mathbf{24.} \quad \mathcal{D} = 8448 \text{ ft}$$

$$\mathcal{S} = 45 \text{ mph} = 3960 \text{ ft/min}$$

$$\mathcal{I} = \frac{8448 \text{ ft}}{3960 \text{ ft/min}} = 2.1333 \text{ min}$$

$$\mathcal{F} = 6 - 2.1333 \text{ min} = 3.8667 \text{ min}$$

$$\mathbf{25.} \quad \mathcal{D} = 28512 \text{ ft}$$

$$\mathcal{S} = 70 \text{ mph} = 6160 \text{ ft/min}$$

$$\mathcal{I} = \frac{28512 \text{ ft}}{6160 \text{ ft/min}} = 4.629 \text{ min}$$

$$\mathcal{F} = 19 - 4.629 \text{ min} = 14.371 \text{ min}$$

$$\mathbf{26.} \quad \mathcal{D} = 7392 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{7392 \text{ ft}}{4840 \text{ ft/min}} = 1.5273 \text{ min}$$

$$\mathcal{F} = 6 - 1.5273 \text{ min} = 4.4727 \text{ min}$$

$$\mathbf{27.} \quad \mathcal{D} = 6336 \text{ ft}$$

$$\mathcal{D}_1 = 2700 \text{ ft} \quad \mathcal{S}_1 = 45 \text{ mph} = 3960 \text{ ft/min}$$

$$\mathcal{I}_1 = \frac{2700 \text{ ft}}{3960 \text{ ft/min}} = .6818 \text{ min} \quad \mathcal{D}_2 = 3636 \text{ ft} \quad \mathcal{S}_2 = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I}_2 = \frac{3636 \text{ ft}}{4840 \text{ ft/min}} = .7512 \text{ min}$$

$$\mathcal{I} = \mathcal{I}_1 + \mathcal{I}_2 = .6818 + .7512 = 1.433 \text{ min}$$

$$\mathcal{F} = 7 - 1.433 \text{ min} = 5.567 \text{ min}$$

$$\mathbf{28.} \quad \mathcal{D} = 31152 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{31152 \text{ ft}}{4840 \text{ ft/min}} = 6.436 \text{ min}$$

$$\mathcal{F} = 21 - 6.436 \text{ min} = 14.564 \text{ min}$$

$$\mathbf{29.} \quad \mathcal{D} = 5280 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{5280 \text{ ft}}{4840 \text{ ft/min}} = 1.0909 \text{ min}$$

$$\mathcal{F} = 3 - 1.0909 \text{ min} = 1.9091 \text{ min}$$

$$\mathbf{30.} \quad \mathcal{D} = 1584 \text{ ft}$$

$$\mathcal{S} = 45 \text{ mph} = 3960 \text{ ft/min}$$

$$\mathcal{I} = \frac{1584 \text{ ft}}{3960 \text{ ft/min}} = .4 \text{ min}$$

$$\mathcal{F} = 2 - .4 \text{ min} = 1.6 \text{ min}$$

## 4 Brown.

1.  $\mathcal{D} = 30624 \text{ ft}$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{30624 \text{ ft}}{4840 \text{ ft/min}} = 6.32737 \text{ min}$$

$$\mathcal{F} = 45 - 6.32727 \text{ min} = 38.67272 \text{ min}$$

2.  $\mathcal{D} = 8448 \text{ ft}$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{8448 \text{ ft}}{4840 \text{ ft/min}} = 1.745455 \text{ min}$$

$$\mathcal{F} = 12 - 1.745455 \text{ min} = 10.254545 \text{ min}$$

3.  $\mathcal{D} = 2640 \text{ ft}$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{2640 \text{ ft}}{4840 \text{ ft/min}} = .54545 \text{ min}$$

$$\mathcal{F} = 4 - .54545 \text{ min} = 1.45455 \text{ min}$$

4.  $\mathcal{D} = 16368 \text{ ft}$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{16368 \text{ ft}}{4840 \text{ ft/min}} = 3.381818 \text{ min}$$

$$\mathcal{F} = 27 - 3.381818 \text{ min} = 23.618182 \text{ min}$$

5.  $\mathcal{D} = 7392 \text{ ft}$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{7392 \text{ ft}}{4840 \text{ ft/min}} = 1.52727273 \text{ min}$$

$$\mathcal{F} = 11 - 1.52727273 \text{ min} = 9.47273 \text{ min}$$

6.  $\mathcal{D} = 13728 \text{ ft}$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{13728 \text{ ft}}{5720 \text{ ft/min}} = 2.4 \text{ min}$$

$$\mathcal{F} = 25 - 2.4 \text{ min} = 23.6 \text{ min}$$

7.  $\mathcal{D} = 377 \text{ ft}$

$$\mathcal{S} = 35 \text{ mph} = 3080 \text{ ft/min}$$

$$\mathcal{I} = \frac{377 \text{ ft}}{3080 \text{ ft/min}} = .1224 \text{ min}$$

$$\mathcal{F} = 1 - .1224 \text{ min} = .8776 \text{ min}$$

8.  $\mathcal{D} = 384 \text{ ft}$

$$\mathcal{S} = 45 \text{ mph} = 3960 \text{ ft/min}$$

$$\mathcal{I} = \frac{384 \text{ ft}}{3960 \text{ ft/min}} = .09697 \text{ min}$$

$$\mathcal{F} = 1 - .09697 \text{ min} = .90303 \text{ min}$$

9.  $\mathcal{D} = 367 \text{ ft}$

$$\mathcal{S} = 45 \text{ mph} = 3960 \text{ ft/min}$$

$$\mathcal{I} = \frac{367 \text{ ft}}{3960 \text{ ft/min}} = .0927 \text{ min}$$

$$\mathcal{F} = 1 - .0927 \text{ min} = .9073 \text{ min}$$

$$10. \mathcal{D} = 3696 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{3696 \text{ ft}}{4840 \text{ ft/min}} = .7636 \text{ min}$$

$$\mathcal{F} = 5 - .7636 \text{ min} = 4.2364 \text{ min}$$

$$11. \mathcal{D} = 1056 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{1056 \text{ ft}}{4840 \text{ ft/min}} = .2182 \text{ min}$$

$$\mathcal{F} = 2 - .2182 \text{ min} = 1.7818 \text{ min}$$

$$12. \mathcal{D} = 2112 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{2112 \text{ ft}}{4840 \text{ ft/min}} = .4364 \text{ min}$$

$$\mathcal{F} = 3 - .4364 \text{ min} = 2.5636 \text{ min}$$

$$13. \mathcal{D} = 4224 \text{ ft}$$

$$\mathcal{S} = 75 \text{ mph} = 6600 \text{ ft/min}$$

$$\mathcal{I} = \frac{4224 \text{ ft}}{6600 \text{ ft/min}} = .64 \text{ min}$$

$$\mathcal{F} = 6 - .64 \text{ min} = 5.36 \text{ min}$$

$$14. \mathcal{D} = 6864 \text{ ft}$$

$$\mathcal{S} = 75 \text{ mph} = 6600 \text{ ft/min}$$

$$\mathcal{I} = \frac{6864 \text{ ft}}{6600 \text{ ft/min}} = 1.04 \text{ min}$$

$$\mathcal{F} = 11 - 1.04 \text{ min} = 9.96 \text{ min}$$

$$15. \mathcal{D} = 6864 \text{ ft}$$

$$\mathcal{S} = 65 \text{ mph} = 5720 \text{ ft/min}$$

$$\mathcal{I} = \frac{6864 \text{ ft}}{5720 \text{ ft/min}} = 1.2 \text{ min}$$

$$\mathcal{F} = 5 - 1.2 \text{ min} = 3.8 \text{ min}$$

$$16. \mathcal{D} = 3168 \text{ ft}$$

$$\mathcal{S} = 75 \text{ mph} = 6600 \text{ ft/min}$$

$$\mathcal{I} = \frac{3168 \text{ ft}}{6600 \text{ ft/min}} = .48 \text{ min}$$

$$\mathcal{F} = 5 - .48 \text{ min} = 4.52 \text{ min}$$

$$17. \mathcal{D} = 3696 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{3696 \text{ ft}}{4840 \text{ ft/min}} = .7636 \text{ min}$$

$$\mathcal{F} = 6 - .7636 \text{ min} = 5.2364 \text{ min}$$

$$18. \mathcal{D} = 26928 \text{ ft}$$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{26928 \text{ ft}}{4840 \text{ ft/min}} = 5.5636 \text{ min}$$

$$\mathcal{F} = 30 - 5.5636 \text{ min} = 24.4364 \text{ min}$$

**19.**  $\mathcal{D} = 6336 \text{ ft}$

$$\mathcal{S} = 50 \text{ mph} = 4400 \text{ ft/min}$$

$$\mathcal{I} = \frac{6336 \text{ ft}}{4400 \text{ ft/min}} = 1.44 \text{ min}$$

$$\mathcal{F} = 11 - 1.44 \text{ min} = 9.56 \text{ min}$$

**20.**  $\mathcal{D} = 3168 \text{ ft}$

$$\mathcal{S} = 25 \text{ mph} = 2200 \text{ ft/min}$$

$$\mathcal{I} = \frac{3168 \text{ ft}}{2200 \text{ ft/min}} = 1.44 \text{ min}$$

$$\mathcal{F} = 8 - 1.44 \text{ min} = 6.56 \text{ min}$$

**21.**  $\mathcal{D} = 3168 \text{ ft}$

$$\mathcal{S} = 75 \text{ mph} = 6600 \text{ ft/min}$$

$$\mathcal{I} = \frac{3168 \text{ ft}}{6600 \text{ ft/min}} = 0.48 \text{ min}$$

$$\mathcal{F} = 5 - .48 \text{ min} = 4.52 \text{ min}$$

**22.**  $\mathcal{D} = 213 \text{ ft}$

$$\mathcal{S} = 75 \text{ mph} = 6600 \text{ ft/min}$$

$$\mathcal{I} = \frac{213 \text{ ft}}{6600 \text{ ft/min}} = .0323 \text{ min}$$

$$\mathcal{F} = 1 - .0323 \text{ min} = .9677 \text{ min}$$

**23.**  $\mathcal{D} = 2640 \text{ ft}$

$$\mathcal{S} = 45 \text{ mph} = 3960 \text{ ft/min}$$

$$\mathcal{I} = \frac{2640 \text{ ft}}{3960 \text{ ft/min}} = .6667 \text{ min}$$

$$\mathcal{F} = 4 - .6667 \text{ min} = 3.3333 \text{ min}$$

**24.**  $\mathcal{D} = 9504 \text{ ft}$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{9504 \text{ ft}}{4840 \text{ ft/min}} = 1.9636 \text{ min}$$

$$\mathcal{F} = 23 - 1.9636 \text{ min} = 21.0364 \text{ min}$$

**25.**  $\mathcal{D} = 11088 \text{ ft}$

$$\mathcal{S} = 55 \text{ mph} = 4840 \text{ ft/min}$$

$$\mathcal{I} = \frac{11088 \text{ ft}}{4840 \text{ ft/min}} = 2.2909 \text{ min}$$

$$\mathcal{F} = 15 - 2.2909 \text{ min} = 12.7091 \text{ min}$$

**26.**  $\mathcal{D} = 3696 \text{ ft}$

$$\mathcal{S} = 60 \text{ mph} = 5280 \text{ ft/min}$$

$$\mathcal{I} = \frac{3696 \text{ ft}}{5280 \text{ ft/min}} = .7 \text{ min}$$

$$\mathcal{F} = 5 - .7 \text{ min} = 4.3 \text{ min}$$

**27.**  $\mathcal{D} = 2640 \text{ ft}$

$$\mathcal{S} = 60 \text{ mph} = 5280 \text{ ft/min}$$

$$\mathcal{I} = \frac{2640 \text{ ft}}{5280 \text{ ft/min}} = .5 \text{ min}$$

$$\mathcal{F} = 4 - .5 \text{ min} = 3.5 \text{ min}$$

$$\mathbf{28.} \quad \mathcal{D} = 528 \text{ ft}$$

$$\mathcal{S} = 60 \text{ mph} = 5280 \text{ ft/min}$$

$$\mathcal{I} = \frac{528 \text{ ft}}{5280 \text{ ft/min}} = .1 \text{ min}$$

$$\mathcal{F} = 1 - .1 \text{ min} = .9 \text{ min}$$

$$\mathbf{29.} \quad \mathcal{D} = 528 \text{ ft}$$

$$\mathcal{S} = 60 \text{ mph} = 5280 \text{ ft/min}$$

$$\mathcal{I} = \frac{528 \text{ ft}}{5280 \text{ ft/min}} = .1 \text{ min}$$

$$\mathcal{F} = 1 - .1 \text{ min} = .9 \text{ min}$$

$$\mathbf{30.} \quad \mathcal{D} = 7920 \text{ ft}$$

$$\mathcal{S} = 45 \text{ mph} = 3960 \text{ ft/min}$$

$$\mathcal{I} = \frac{7920 \text{ ft}}{3960 \text{ ft/min}} = 2 \text{ min}$$

$$\mathcal{F} = 13 - 2 \text{ min} = 11 \text{ min}$$