$$\text{BFL} = \frac{0.863}{1 + 2.3G}\left(\frac{W/S}{\rho g C_{L_{\text{climb}}}} + h_{\text{obstacle}}\right)\left(\frac{1}{T_{\text{av}}/W - U} + 2.7\right) + \left(\frac{655}{\sqrt{\rho/\rho_{\text{SL}}}}\right) \tag{17.112}$$

$$\text{JET: } T_{\text{av}} = 0.75\, T_{\substack{\text{takeoff}\\ \text{static}}}\left[\frac{5 + \text{BPR}}{4 + \text{BPR}}\right] \tag{17.113}$$

$$\text{PROP: } T_{\text{av}} = 5.75\ \text{bhp}\left[\frac{(\rho/\rho_{\text{SL}})N_e D_p^2}{\text{bhp}}\right]^{\frac{1}{3}} \tag{17.114}$$

where

BFL = balanced field length (ft)
G = $\gamma_{\text{climb}} - \gamma_{\text{min}}$
γ_{climb} = arcsine $[(T-D)/W]$, 1-engine-out, climb speed
γ_{min} = 0.024 2-engine; 0.027 3-engine; 0.030 4-engine
$C_{L_{\text{climb}}}$ = C_L at climb speed (1.2 V_{stall})
h_{obstacle} = 35 ft commercial, 50 ft military
U = 0.01 $C_{L_{\text{max}}}$ + 0.02 for flaps in takeoff position
BPR = bypass ratio
bhp = engine brake horsepower
N_e = number of engines
D_p = propeller diameter (ft)