

NAME: Toheed Ali

ID# 12196

Submitted To: Engr. Alif Afridi

Subject: Highway and Transportation
Engineering.

Iqra National university Peshawar.

Question:

Calculate the actual length of runway from the following data.

- ① Air port elevation = R.L = 100
- ② Air port reference temperature = 30°C
- ③ Basic length of runway = 800 m
- ④ Highest point along the length - R.L = 98.2
- ⑤ Lowest point along the length - R.L = 95.2

Solution:

Correction of elevation:

The basic length is to be increased at the rate of 7% per 300m elevation above mean sea-level.

$$\text{Correction of elevation} = 800 \times \frac{7}{100} \times \frac{100}{300} = \underline{\underline{18.6\text{m}}}$$

Basic length of runway after

$$\text{Correction for elevation} = (800 + 18) = \underline{\underline{818\text{m}}}$$

(2)

Correction for temperature =

Standard atmospheric temperature at
mean sea-level = 15°C

Taking the temperature gradient is equal to
 6.5°C per 1000m rise in elevation, the standard
temperature at the airport, site will be.

$$\text{Temperature at R.L} = 100 = 15 - \left[6.5 \times \frac{100}{100} \right] = 14.3^{\circ}\text{C}$$

Difference between airport reference temperature
and standard atmospheric temperature
 $= (30 - 14.35) = 15.65^{\circ}\text{C}$

Applying correction at the rate of 1% for
every 1°C .

$$\begin{aligned} \text{Correction for temperature} &= \left[\frac{1}{100} \times 818 \right] \times 15.65 \\ &= 128.017 \\ &= \underline{\underline{128\text{m}}} \end{aligned}$$

③

$$\begin{aligned} \text{Corrected runway length} &= (818 + 128) = \underline{\underline{946\text{m}}} \\ \text{Effective gradient} &= \frac{\text{R.L. } 98.2 - \text{R.L. } 95.2}{800} \\ &= \frac{3}{800} = \underline{\underline{0.003}} \end{aligned}$$

Applying correction for the effective gradient at rate of 20% for each 1% effective gradient.

$$\begin{aligned} \text{Correction for gradient} &= \left[\frac{20}{100} \times 946 \right] \times \frac{0.003}{1} \\ &= \underline{\underline{0.56}} \end{aligned}$$

$$\begin{aligned} \text{Actual length of runway} &= (946 + 0.56) \\ &= \underline{\underline{946.56\text{m}}} \quad \text{Ans} \end{aligned}$$

Check: Total Correction for elevation and Temperature = $(18 + 128) = 146\text{m}$

$$\% \text{ age increase} = \frac{146}{800} \times 100 = \boxed{18.25}$$

According to ICAO, this should not be more than 35%.