

**CEPE- 704 /**

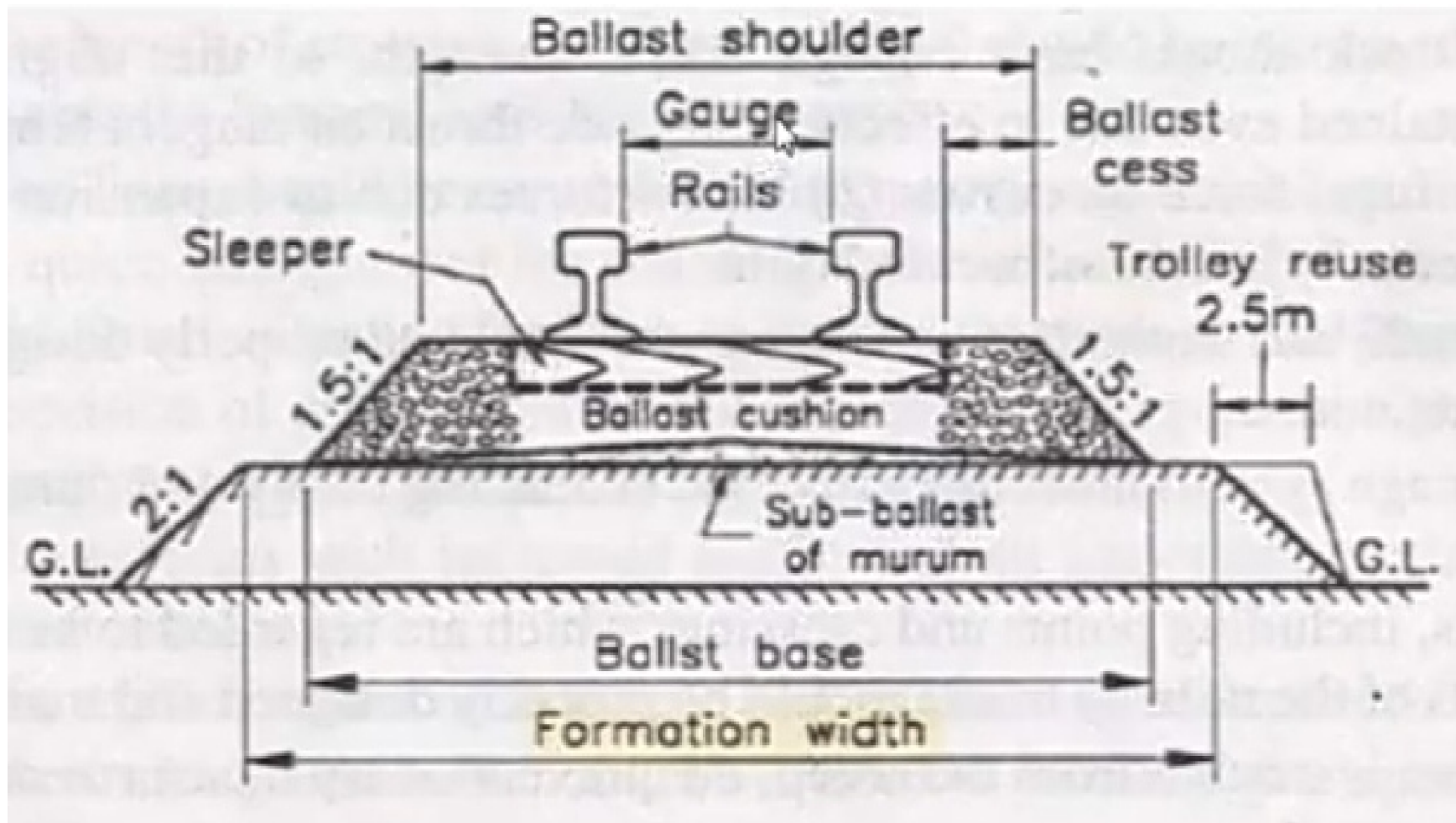
**Railways, Air Ports and Harbour Engineering**

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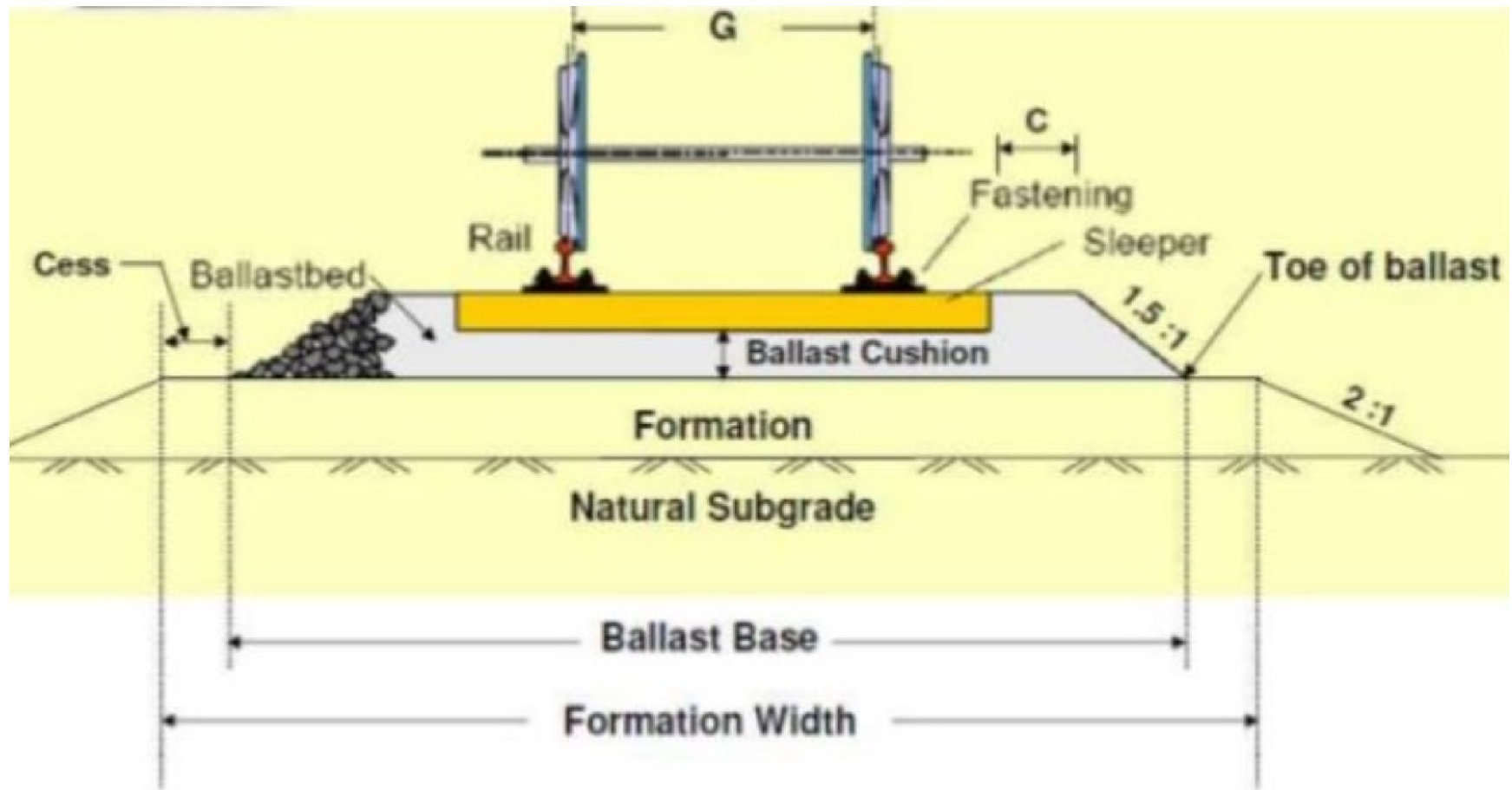
Associate professor

Department of Civil Engineering

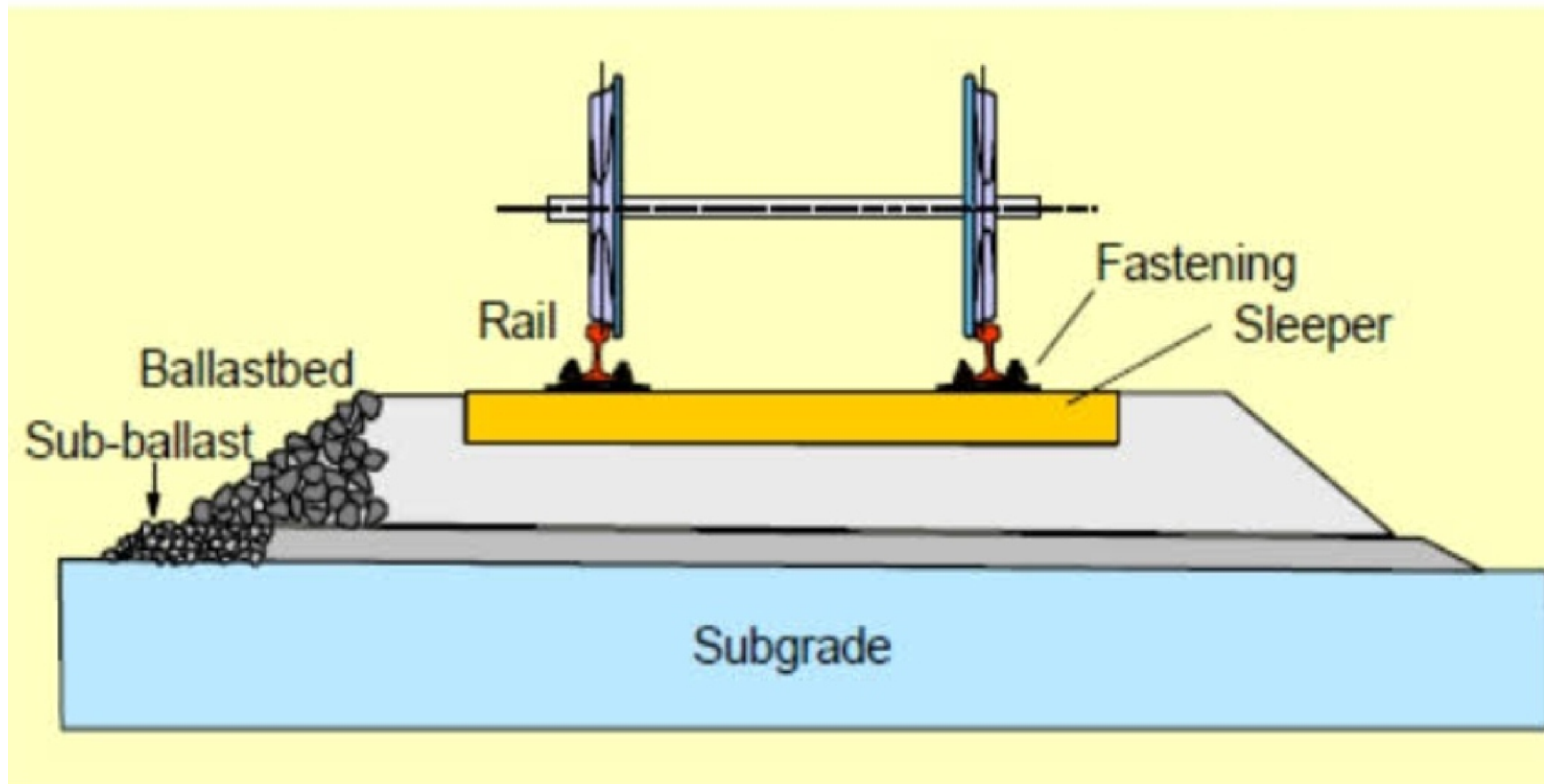
# Typical cross section of permanent way



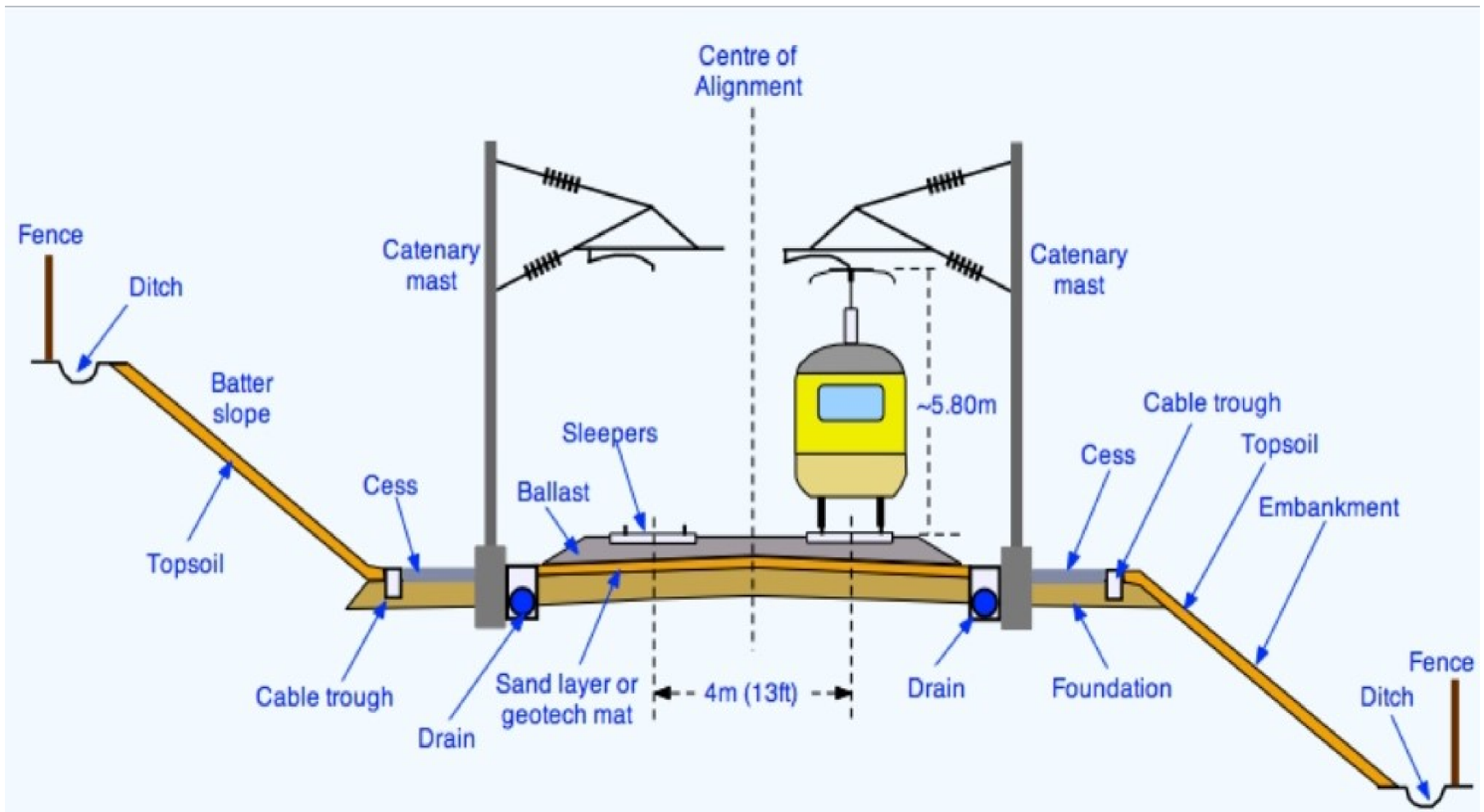
# Typical cross section of permanent way



# Typical cross section of permanent way



# Double track railway alignment and over head power supply system



# Runway Geometric Design

**ICAO gives various geometric standards for the airport design**

- Runway length
- Runway width
- Width & length of safety area
- Transverse gradients
- Longitudinal & effective gradient
- Sight distance

# Runway Geometric Design

## 1) Runway length

The basic runway length as recommended by ICAP for different types of airport are there. To obtain the actual length of runway, corrections for elevation, temperature & gradient are applied to the basic runway length.

## 2) Runway Width

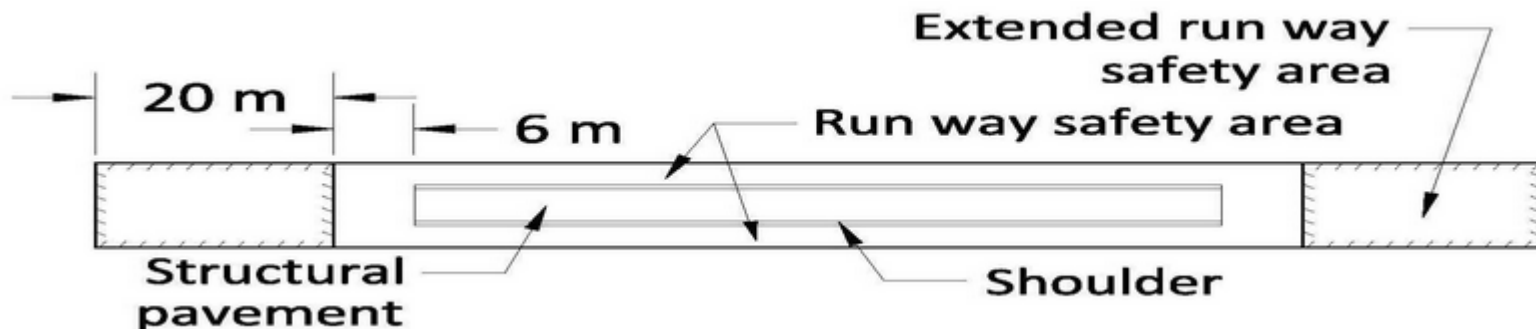
- ICAO recommends the pavement width varying from **45 m – 18 m** for different types of aircraft.
- The aircraft traffic is more concentrated in the **central 24 m width** of the runway pavement.

# Runway Geometric Design

## 3) Width & Length of safety area

- Safety area consists of the runway, which is paved area plus the shoulder on either side of runway plus the area is cleared, graded & drained as shown in fig.
- The shoulder are usually unpaved as they are used during emergency.
- ICAO recommends.

	Types of air port	Width of safety area
Non-instrumental runway	A, B & C	150 m
	D & E	78 m
Instrumental runway	A, B, C, D & E	Min. 300 m





**Thank you**