

RAILWAYS, BRIDGES & TUNNELS

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Railway Engg.

“The branch of civil engg. Which deals with the design, construction and maintenance of the railway tracks for safe & efficient movement of trains is called **Railway Engg.**”

- ❖ Advantage & Disadvantages
- ❖ Necessity
- ❖ System of railways
- ❖ Permanent way



Advantages of Railways

- Railways provide a comfortable and safe means of transportation.
- Its speed over long distances is more than any other mode of transport, except airways.
- Railway transport is economical, quicker and best suited for carrying heavy and bulky goods over long distances.
- Railway is the safest form of transport. The chances of accidents and breakdowns of railways are minimum as compared to other modes of transport.

Disadvantages of Railways

- Because goods in bulk quantities are carried chances of goods getting lost are high in case of railway transport as compared to air and road transport.
- Railway transportation is particularly unsafe for carrying fragile items like glass because these items can easily break at times when a train halts unexpectedly .
- Because railway is the cheapest medium of transport, it is hard to find suitable bookings for the transportation of your goods. Railway transport is not suitable in cases of emergency.
- Proper railway system is not build up in the Indian villages as a result of which railway transport is unsuitable in the villages.

Necessity

- Railways are significant & potential means of transporting men and material over large distances in a country.
- This economical transport system enables the local growers to get adequate returns for the efforts from extended markets
- Railways plays its vital role in national defence of a country by transporting army & ammunition quickly on a large scale during war days.
- Railways form a main source of revenue to the country without any taxation.

System Of Railways

There are four types of railways systems;

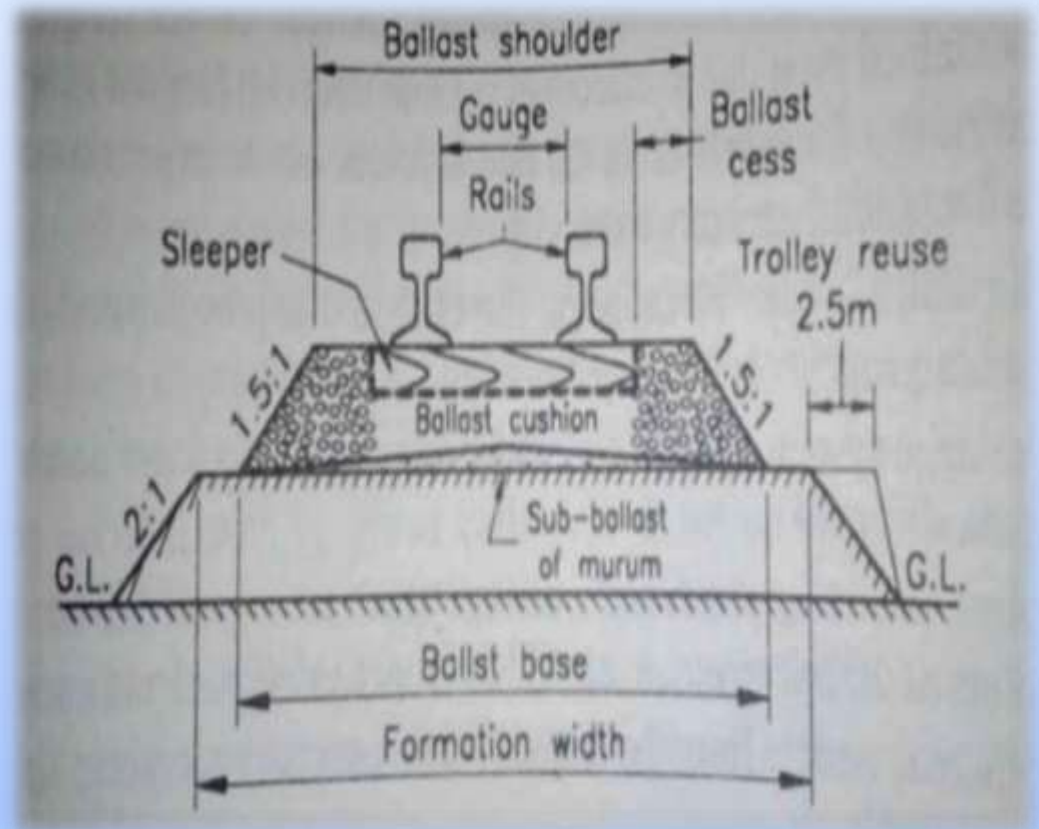
1. **Surface railways-** The railways provided over the ground surface is called surface railways.
2. **Elevated railways-** The railways provided at higher or elevated portion, above the ground surface is called elevated railways.
3. **Under ground railways-** The railways provided just below the ground level are called U.G. railways.
4. **Tube railways-** The railways provided underground at a greater depth of about 18m-52m are called tube railways.

Permanent Way

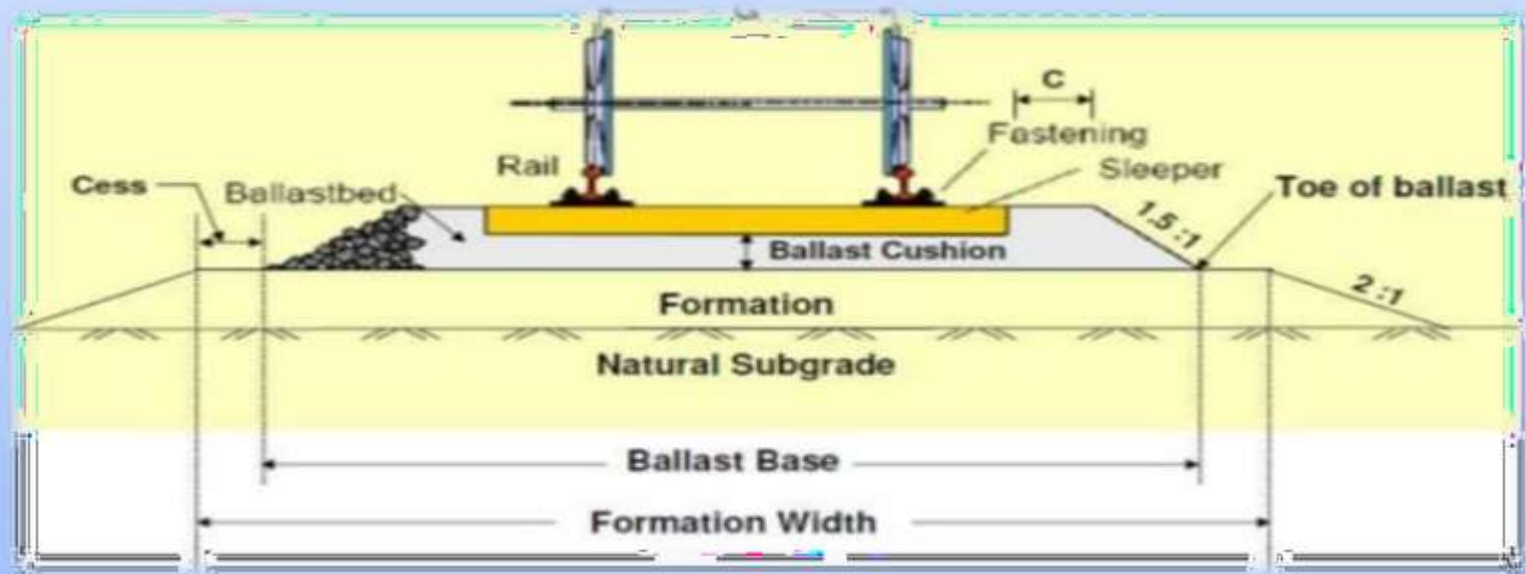
Permanent way may be defined as the railway track which provides easy & safe movement to trains.

It consists of-

- Formation or subgrade
- Ballast
- Sleepers
- Rails
- Fixtures & Fastenings



surface, which is ready to receive the ballast, sleepers, and rails, is called the formation. The formation is an important constituent of the track, as it supports the entire track structure.



Ballast

- Broken Stone
- Gravel
- Cinders / Ashes
- Sand
- Kankar
- Moorum
- Brick Ballast
- Selected Earth



Sleepers

- Wooden Sleepers
- Steel Sleepers
- Cast Iron Railway Sleepers
- Concrete Railway Sleepers



Rails

Rails may be defined as the rolled steel sections laid in two parallel lines over the sleepers to form the track are known as **Rails**.

Functions of Railways-

- It provides a hard, smooth Surface for passage of trains.
- It bears the stresses developed due to loads.
- It transmit loads to sleepers and consequently reduce pressure on ballast & formation.



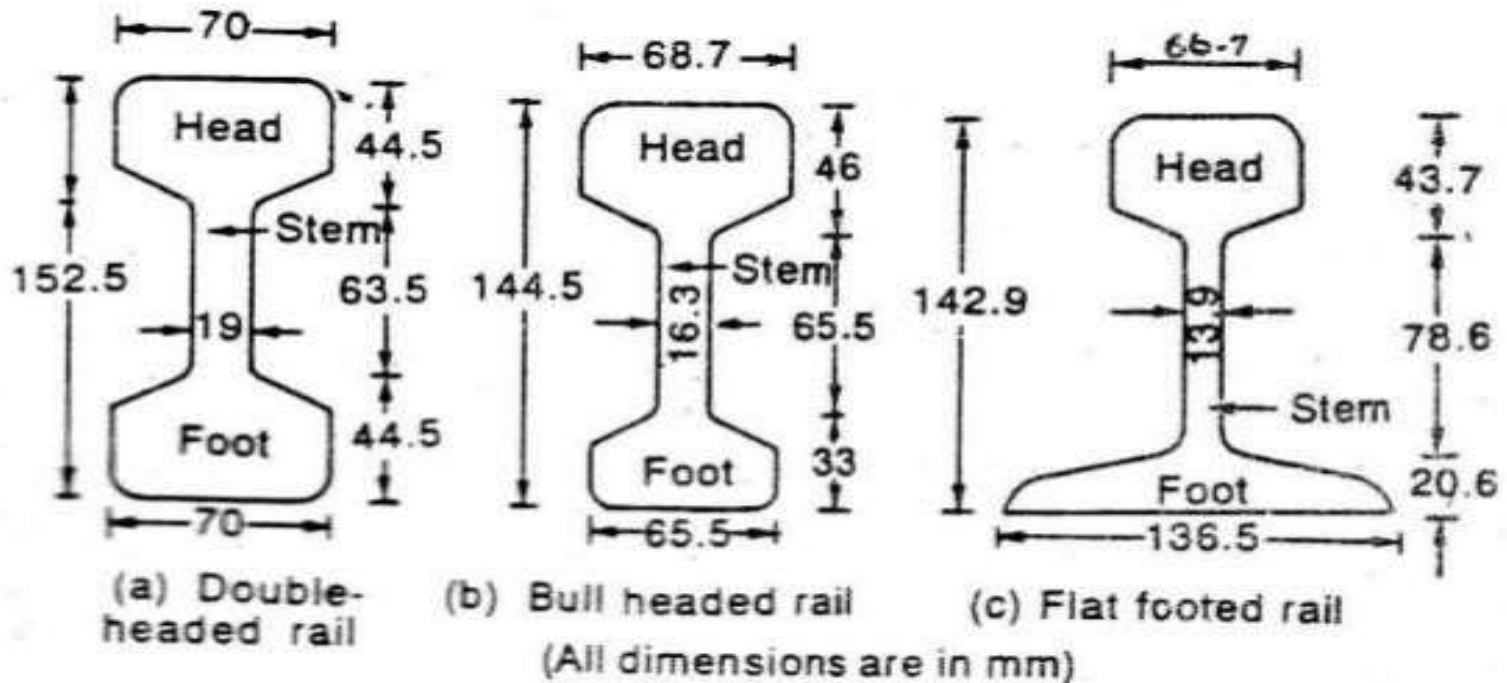
Types of Rails

There are three types of rails;

1. Double headed rails

2. Bull headed rails

3. Flat footed rails



Rail Gauge

- Gauge is defined as the minimum horizontal distance between the inner faces of the two rails.

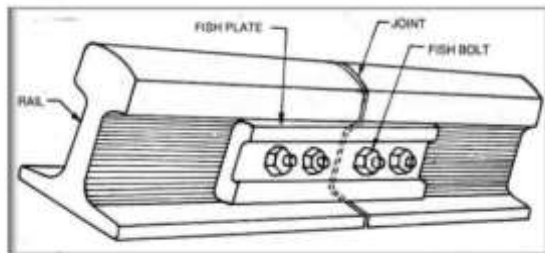
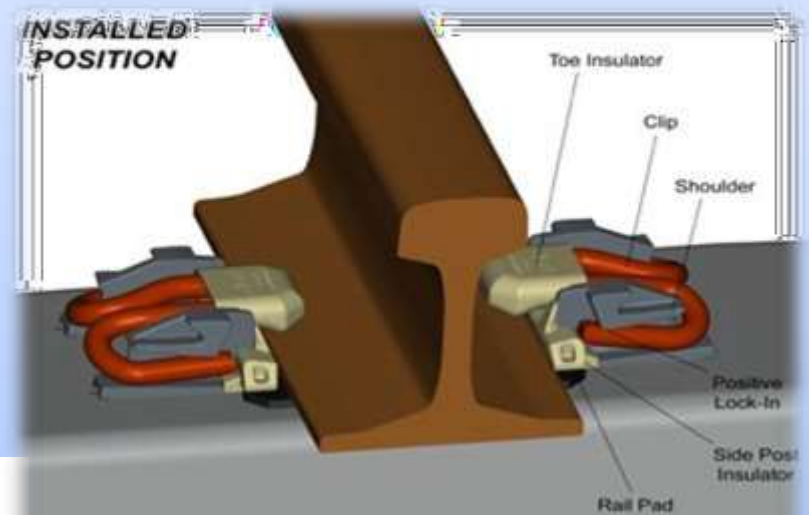
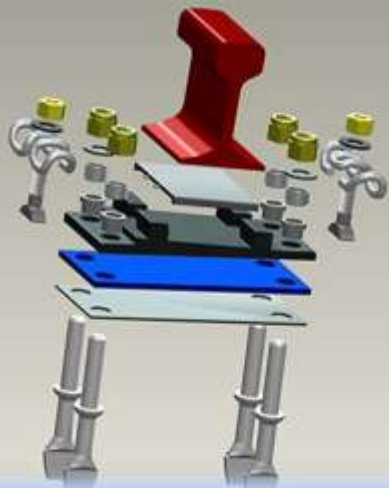
There are three types of rail gauge;

Broad
Gauge
(1676m
m)

Meter
Gauge
(1000m
m)

Narrow
Gauge
(762mm
&
710mm)

Make track to run technical aspects are termed as Fixtures & Fastenings.



Crossing & Pointing

Point and Crossings are peculiar arrangement used in permanent way (railway track) to guide the vehicle for directional change. Broadly point and crossing assembly consists of three main components namely **Point, Lead and Crossing element.**



Maintenance

1. Due to the constant movement of heavy and high-speed trains, the packing under the sleepers becomes loose and track geometry gets disturbed. The gauge, alignment, and longitudinal as well as cross levels of the track thus get affected adversely.
2. Due to the vibrations and impact of high-speed trains, the fittings of the track come undone and there is heavy wear and tear of the track and its components.
3. The track and its components get worn out as a result typical climatic conditions.

TO GET RID-OFF ANY PROBLEM OF THE TRACKS, MAINTENANCE SHOULD BE DONE AFTER A PROPER TIME PERIOD.