

# Pavement Construction Technique

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# Compaction Equipment for Construction of Embankment



## **STATIC SMOOTH WHEELED ROLLERS**

- Well graded sand, gravel, crushed rock, asphalt etc. where crushing is required.
- Used on soils which does not require great pressure for compaction and are generally used for finishing the upper surface of the soil.
- The gross weight of these rollers is in the range of 8-10 tonnes. About 8 passes are adequate for compacting 20 cm layer.



## **VIBRATING SMOOTH WHEELED ROLLERS**

- Higher compaction level can be achieved with maximum work.
- Compaction can be done up to greater depths.
- These rollers are expensive but in long term the cost becomes economical due to their higher outputs and improved performance.
- Vibratory rollers are now available weighing from 4 to 6 tonnes.



## **PNEUMATIC TYREDROLLERS**

- Pneumatic tyred rollers are also called as rubber tyred rollers.
- Generally pneumatic tyred rollers are used in pavement subgrade works both earthwork and bituminous works.
- The factors which affects the degree of compaction are tyre inflation pressure and the area of the contact.
- The gross weight of the roller is about 6 to 10 tonnes which can be increased to 25 tonnes.



## **SHEEP FOOT ROLLERS**

- Sheepsfoot rollers are used for compaction of soils in dams, embankments, subgrade layers in pavements and rail road construction projects.
- These rollers are also called tamping rollers.
- The coverage area is about 8 to 12%.
- The thickness of compacting layer is kept about 5 cm more than the length of each foot and 10 to 20 passes are generally required to give complete coverage





## RAMMERS

- Rammers are used for compacting small areas by providing impact load to the soil.
- For machine operated rammers, the weight varies from 30kg to 10 tonnes.
- Rammers are suitable for compacting cohesive soils as well as other soils.
- These equipment's are used for soil compacting of small areas only and where the compacting effort needed is less.



## VIBRATING PLATE COMPACTORS

- Vibrating plate compactors are used for compaction of coarse soils with 4 to 8% fines.
- These equipment's are used for small areas.
- The usual weights of these machines vary from 100 kg to 2 tonne.
- This machine is suitable for compaction of all types of soil by vibrations set up in a base plate through a spring activated engine driven mechanism.

# Construction of Earth Roads

# General Features of Earth Road

- ❑ Surface Course (100 mm)
- ❑ Base Course (100mm)
- ❑ Sub-grade (300mm)
- ❑ Desired Camber/Cross-slope (4-5%)
- ❑ Base Course soil (L.L<30%; P.I<6; Clay content<5%; Silt content (9-32)%; Sand and gravel (60-80)%)
- ❑ Surface Course soil (L.L<30%; P.I (4-10); Clay content<(10-18)%; Silt content (5-15)%; Sand and gravel (65-80)%)

❑ Preparing the subgrade

❑ Rolling and watering

❑ Spreading the soil

❑ Rolling

❑ Excavation of road side drains

❑ Correction for Camber

❑ Curing

❑ Opening to traffic

## Precaution to be Taken While Constructing Earth Road.

- ▶ The camber to be provided in the construction of this road should be very steep i.e values from between 1 in 20 to 1 in 33 should be adopted.
- ▶ To prevent the erosion of soil due to rain water, the maximum gradient should be 1 in 20.
- ▶ To dispose off the rain water, the height of the embankment should be above 600 mm.

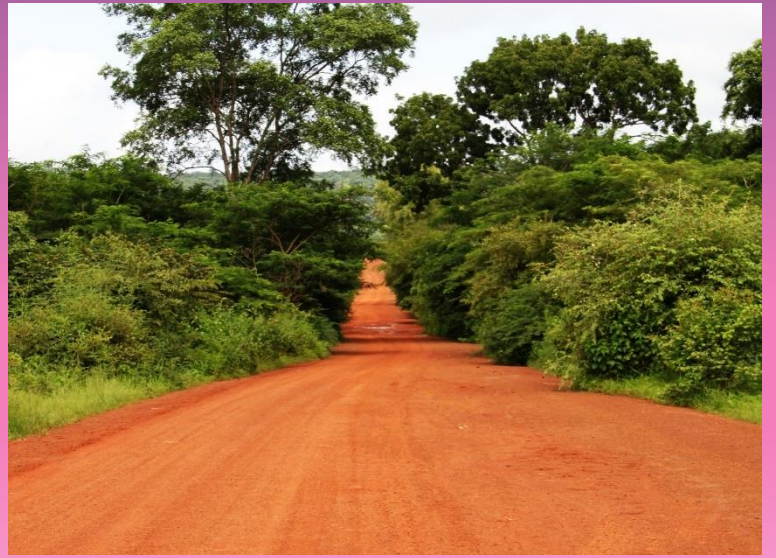
## Advantages :

- ▶ The construction of earth road is a fast process.
- ▶ In future if other type of road is going to be constructed on the existing earth road, it gives good foundation.
- ▶ The overall process is relatively cheaper than other road types.

## Disadvantages :

- ▶ These roads are only useful for light traffic. It cannot sustain the lifespan of the road if it is allowed for heavy traffic.
- ▶ This type of road wears quickly and the maintenance is little bit costlier.
- ▶ This type of road cannot be constructed or it will be worthless in the areas where monsoon is on peak or areas that have maximum rainfall, as constant and excess rainfall lashes out these Kind of roads.





# Construction of Gravel Roads



# General Features of Gravel Road

- ❖ A gravel road is a type of unpaved road surfaced with gravel.
  - ❖ Can carry heavier traffic compared to earth roads.
  - ❖ Desired Camber/Cross-slope (1 in 25 or 1 in 30)
  - ❖ Types : Trench & Feather
- Base Course [150-275mm] (50-70% gravel; 25-40% Sand; 5% Silt)
  - Surface Course [100mm]

- Stacking of gravel
- Spreading to achieve desired camber
- Correction for Camber
- Setting of location pegs
- Rolling & Spraying
- Opening to traffic
- Preparation of Subgrade

**Gravel layer** is the surface and final layer cover the embankment layer, built up from coarse and granular materials that should have certain engineering properties such as CBR and should not have high plasticity index.

Gravel layer has the greatest cost impact in gravel road construction due of availability of gravel borrow pits which is commonly found far from the work site resulting in cost impact due of transportation. Construction of gravel layer is similar to that of embankment. But each layer should not more than 0.15m if it is too high.

Gravel roads require much more frequent maintenance than paved roads, especially after wet periods and when accommodating increased traffic. Wheel motion shoves material to the outside (as well as in-between travelled lanes), leading to rutting, reduced water-runoff, and eventual road destruction if unchecked. As long as the process is interrupted early enough, simple re-grading is sufficient, with material being pushed back into shape.

