

## 4.8 Pavement Construction Machineries

### Necessity of Machinery

- Increase the rate of output through work progress
- Reduce the overall construction costs
- Carry out activities which cannot be done manually
- Save construction time
- Maintain the planned rate of production
- Maintain the high quality standards
- Eliminate the various hazards and health issues

### Selection of Machinery

The selection of a machinery is based on the following factors;

- Purchase Cost
- Depreciation
- Maintenance
- Fuel

## EXCAVATION MACHINERY

### 1.Excavators

Excavators are being used at site as follows;

- Digging of trenches
- Material handling
- Forestry work
- Demolition
- Heavy lift
- Mining etc.

Performance of excavator can be measured from the production cycle.

- It is the time that an excavator took to load the bucket from source, swing, dump, return back and dig again.
- Therefore, faster the operation speed, the faster will be the complete and hence production cycle will be increase.



## 2.Chain Excavator

- Chain wheel system
- Used in hilly areas where risks of sliding of machinery are on the verge.
- Chain excavators has low ground pressure because of spreading of load on large area. Therefore, it is also used where soil support is weak.



## 3. Dragline

Dragline is being used for the following purposes;

- Used to excavate earth and load it into hauling units
- Used to deposit the excavated earth on the banks
- To dig soft or medium hard materials
- Digging is at or well below ground level
- Where materials are to be lifted from a pit
- Where wet conditions exist



Advantages:

- Can do the underwater digging work
- For digging from the pit, need not to go into the pit.

Disadvantages:

- To increase the length of the boom means to decrease the size of the bucket.

#### 4. Dozers

Bulldozers used for the following operations

- Level the earth
- Clear construction site of debris
- Clear floors of the borrow pits
- Back-fill trenches
- Move earth for distances from 80 to 100 meters
- Construct temporary roads through difficult areas.

#### Classification

On the basis of blades direction

- Bulldozers: These are mounted blades, perpendicular to the direction of travel.
- Angle dozers: These are mounted with the blades set at an angle with the direction of travel. The angle of inclination of the blade is kept up to 65 degree

On the basis of mountings

- Wheel-tractor mounted bulldozer
- Crawler-tractor bulldozer

According to the method of raising and lowering the blades

- Cable controlled and Hydraulic controlled

## 5.Back hoe

A backhoe, also called a rear actor or back actor, is a piece of excavating equipment consisting of a digging bucket on the end of a two-part articulated arm.



## ROAD LEVELING MACHINERY

### Grader

A grader, is construction machine with a long blade used for the following purposes;

- For spreading heaped earth into layers
- For maintaining cross section of the embankment
- For shaping the cross section during construction
- The output of a grader in four passes, is about 1300 sq. m per hour.
- Length of blade is about 3.5 meter.
- It is capable of turning, tilting, raising and lowering

General graders used are of power 100 to 150 HP





## ROAD COMPACTING MACHINERY

### 1. Roller

Roller is one of the essential equipment required for road construction. A road roller is a compactor type engineering vehicle used to compact;

- Soil
- Gravel
- Asphalt in the construction of roads

Rollers are of the following types;

- Smooth wheeled rollers
- Pneumatic tyred rollers
- Sheep's foot rollers
- Vibratory rollers

#### Smooth Wheeled Rollers:

- May be of two axles or three axles
- Three axles rollers are very heavy and generally not used in road construction
- Two axles rollers may be of two wheels or three wheels
- Three wheeled rollers having weight 8-10 tones
- Two wheels rollers are called tandem roller
- Diameter and width of rear roll is 145 cm and 50 cm
- Rolling width is 200 cm



**Pneumatic Tyred Rollers:**

- Usually used in for compacting asphalt layer in road construction
- The rear axle has one wheel more than the front axle
- Rear wheels are spaced in such manner that these travel over the surface between the front wheels
- Generally four wheels in front and five in rear

**Viboratory Rollers:**

- These rollers vibrates during the compaction
- Suitable for granular soil
- Steel drum is 1.2 to 1.5 m long and 0.9 to 1.2 m in diameter
- Weighs from 0.5 Ton to 15 Ton
- Help to increase the shear capacity of earth



### Sheep's Foot Rollers:

- Consist of hollow circular steel drum with steel projections in the form of sheep's foot
  - Projections are called tamping feet
  - Steel drum is 1.2 to 1.5 m long and 0.9 to 1.2 m in diameter
  - Weighs from 3 Ton to 4.5 Ton
- Suitable for cohesive soils



## TRANSPORTATION MACHINERY

- The equipment used for transportation of material are known as hauling equipment.
- Haulers may operate on the roadways or railways. It involve
- Transportation of materials.
- Carriage and disposal of excavated earth.
- Haulage of heavy construction equipment.

### 1. Dump Truck

- A dumper truck is a truck used for transporting loose material such as sand, gravel, or dirt) for construction.
- Dump truck is fitted with a trolley at the rear which can be tilted.
- The trolley is lifted with the help of one or two hydraulic operated pistons.





## 2.Tractor Trolley

Tractors have many uses as construction equipment, their primary purpose is to pull or push loads. They are used as mounts for many other accessories such as front-end shovels



## WATERING MACHINERY

### Water Bowser

- Use for watering purpose on road



## PAVEMENT MACHINERY

### 1.Bitumen Sprayer

- This Equipment is used for tack coat and Bitumen Spraying application.
- It is capable of applying a uniform unbroken coating of hot Bitumen on specified surface in prescribed quantity.





## 2.Paver

- A paver (asphalt finisher, paving machine) is a piece of construction equipment used to lay asphalt on roads, bridges, parking lots and other such places.
- It is very suitable for multi lane roads.
- Can maintain the specified thickness of the layer.
- The paver operates at speed of 1.5 to 10 m per minute.
- The mat width can be adjusted in the range of 2 to 5 meter.



## 3.Concrete Transirt Mixer

- They are mainly used for transporting concrete from batching point.
- capacity:- 3cum- 9cum.



- A concrete plant, also known as batching plant, is a device that combines various ingredients to form concrete.
- A concrete plant can have a variety of parts and accessories, including mixers, conveyors, aggregate bins, cement bins, heaters, batch plant controls.
- The center of the concrete batching plant is the mixer.

#### 4.Vibrator

- To eliminate the air voids in reinforced concrete
- Increases the unit weight of the concrete
- Due to less voids, lesser water absorbs
- Less voids increase the strength of the concrete

