JECRC Foundation

JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE

JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTER

Class – VI A & B
Subject – Construction Technology & Equipment
Ch – 5 (Construction Planning)
Presented by – Shivangni Khandelwal (Assistant Professor)

VISSION AND MISSION OF INSTITUTE

VISION

To become a renewed center of outcome based learning, and work towards academic, professional, culture and social enrichment of the lives of inviduals and communities.

MISSION

Focus on evaluation of learning outcomes and motivate students to inculcate research Aptitude by project based learning. Identify, based on informed perception of Indian, Regional and global needs, areas of focus and provide platform to gain knowledge and solutions. Offer opportunities for interaction between academia and industry. Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

VISSION AND MISSION OF DEPARTMENT

VISION

To become a role model in the field of Civil Engineering for the sustainable development of the society.

MISSION

1)To provide outcome base education.

2)To create a learning environment conducive for achieving academic excellence.

3)To prepare civil engineers for the society with high ethical values

SYLLABUS

S NO.	CONTENT
1	**Introduction:** Objective, scope and outcome of the course.
2	**Engineering Economy:** Principle of Engineering Economy, Minimum cost point analysis, Breakeven point analysis, Depreciation and depletion
3	**Safety in construction:** Causes, classification, cost and measurement of an accident, safety programme for construction, protective equipment, accident report, safety measure: (a) For storage and handling of building materials. (b) Construction of elements of a building (c) In demolition of buildings; Safety lacuna in Indian scenario. Fire safety provisions as per NBC.
4	**Construction Planning:** Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control; **Materials Management**: Objective and functions of material management
5	**Construction Equipment and Management:** Earth Moving Equipment-Bull dozers tractor pulled scrapers Power shovels Draglines clamshells; cranes; Hoes, Trenching machine types Hauling Equipment; Drilling, Blasting and Tunneling Equipment; Pile Driving Equipment

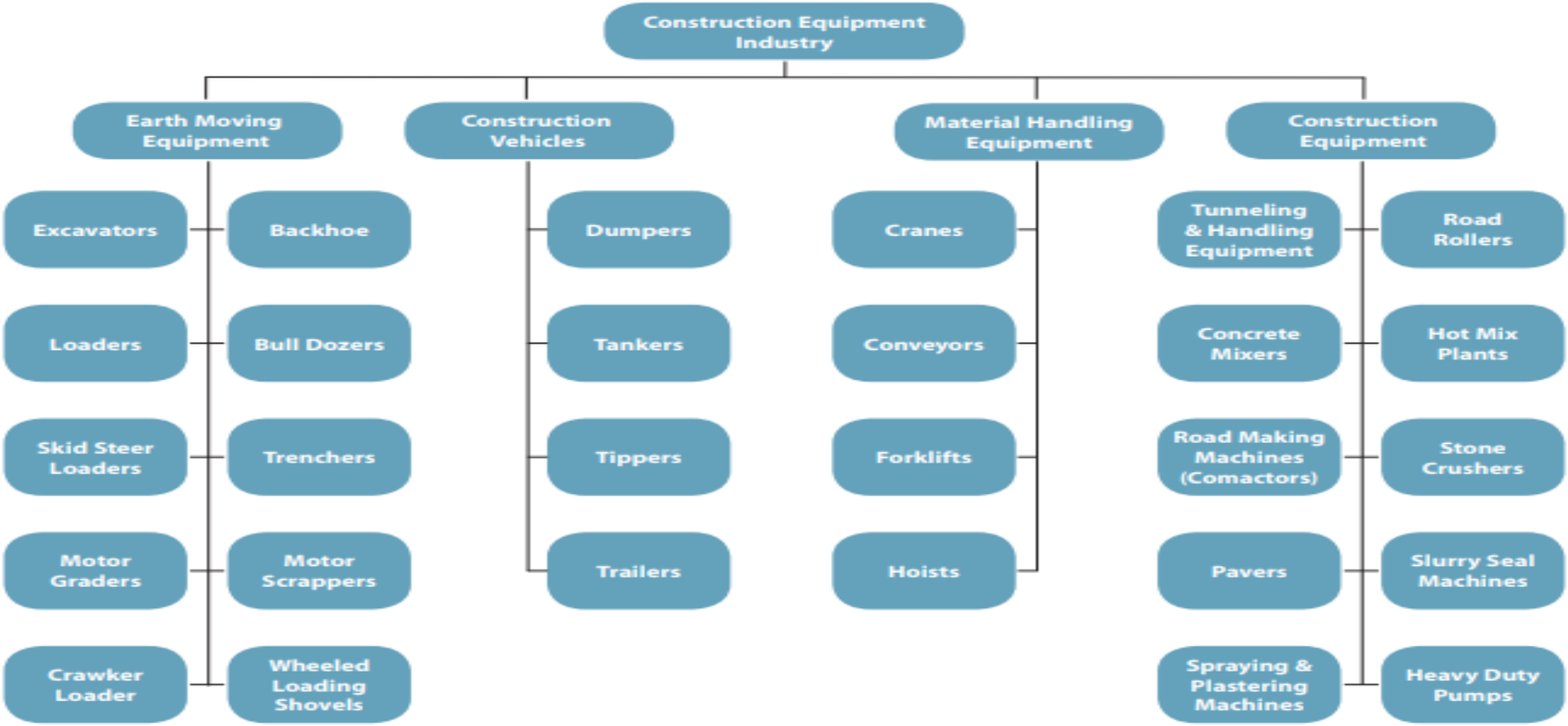
COURSE OUTCOME

CO 1	To understand the concept of Engineering Economy, Depreciation and Depletion.
CO 2	To understand safety in construction.
CO 3	To understand need of construction planning and objective of material management.
CO 4	To understand the various technology and equipment involved in construction.

Construction Equipment

- Construction equipment refers to heavy-duty vehicles, specially designed for executing construction tasks, most frequently ones involving earthwork operations.
- They are also known as heavy machines, heavy trucks, construction equipment, engineering equipment, heavy vehicles, or heavy hydraulics.
- Proper use of appropriate equipment contributes to the Economy, Quality, Safety, Speed, and Timely completion of the Project. Construction equipment is an important part of any construction process. It is not always desirable or possible for the Contractor to own each and every type of Construction Equipment required for the Project.
- The basic operations involved in the construction of any Project are Excavation, Digging of large quantities of earth, Moving them to fairly long distances, Placement, Compacting, Leveling, Dozing, Grading, Hauling, etc.

Types of Construction Equipment



Earth Excavators

Excavators are heavy equipment consisting of a boom, bucket and cab on a rotating platform (known as the "house"). The house sits atop an under carriage with tracks or wheels. All movement and functions of the excavator are accomplished through the use of hydraulic fluid, be it with rams or motors.

Earth Excavators

Types Of Excavator:

Compact Excavator
Crawler Excavator
Wheeled Excavators
Backhoe Loader
Dragline Excavator
Bucket Wheel Excavator
Long Reach Excavator
Power Shovel
Suction Excavator

Earth Excavators

Excavators are used in many ways:

- Digging of trenches, holes and foundations
- Material handling
- Brush cutting with hydraulic attachments
- Forestry work
- Demolition
- General grading/landscaping
- Heavy lift, e.g. lifting and placing of pipes
- Mining, especially, but not only open-pit mining
- River dredging
- Driving piles, in conjunction with a Pile Driver

Earth Excavators

Compact Excavator

- A compact or mini excavator is tracked or wheeled vehicle with an approximate operating weight from 0.7 to 7.5 tons. It generally includes a standard backfill blade and features independent boom swing.
- Hydraulic Excavators are somewhat different from other construction equipment in that all movement and functions of the machine are accomplished through the transfer of hydraulic fluid.
- The compact excavator's work group and blade are activated by hydraulic fluid acting upon hydraulic cylinders. The excavator's slew (rotation) and travel functions are also activated by hydraulic fluid powering hydraulic motors.

Earth Excavators

Compact Excavator

Earth Excavators

Crawler Excavator

1. Mini-Crawler Excavator (2700kg - 5000kg)

With a wide range of available sizes and features like Power Tech engines, zero-tail-swing, offset boom, multiple attachments and ultracomfortable operator stations, there's excavator to fit every job. Hydraulic management system, which helps by balancing hydraulic pressure and flow and sensing when extra power is needed without draining other systems. Operating weights range from 1,730 kg–76,450 kg.

Earth Excavators

Crawler Excavator

2. Heavy Crawler Excavator (Operating Weight 40,000kg – 80,000kg)

Crawler excavator gets the job done with muscle, control and peerless productivity. Efficient, cool-running engines and enhanced hydraulics make these the most-reliable and hardest-working excavators yet. Climb into one of these best-in-class cabs and unleash a mighty workhorse to tackle toughest jobs.

Earth Excavators

Wheeled Excavators

Wheeled excavators easily navigate streets and hard surfaces to deliver powerful bucket forces in well-balanced, high-stability machines. Even with all that muscle outside, operators find quiet comfort inside spacious air-conditioned cabs. Low-effort levers deliver smooth boom and bucket control.

Earth Excavators

Backhoe Loader

Backhoe loader, also called a loader backhoe and commonly shortened to backhoe, is a heavy equipment vehicle that consists of a tractor fitted with a shovel/bucket on the front and a small backhoe on the back. Due to its (relatively) small size and versatility, backhoe loaders are very common in urban engineering and small construction projects (such as building a small house, fixing urban roads, etc).

Earth Excavators

Dragline Excavator

Dragline Excavation Systems are heavy equipment used in civil engineering and surface mining. In civil engineering the smaller types are used for road and port construction. The larger types are used in stripmining operations to move overburden above coal, and for tar-sand mining. Draglines are amongst the largest mobile equipment ever built on land, and weigh in the vicinity of 2000 metric tons, though specimens weighing up to 13,000 metric tons have also been constructed.

Earth Excavators

Power Shovel

A power shovel (also stripping shovel or front shovel or electric mining shovel) is a bucket-equipped machine, usually electrically powered, used for digging and loading earth or fragmented rock and for mineral extraction.

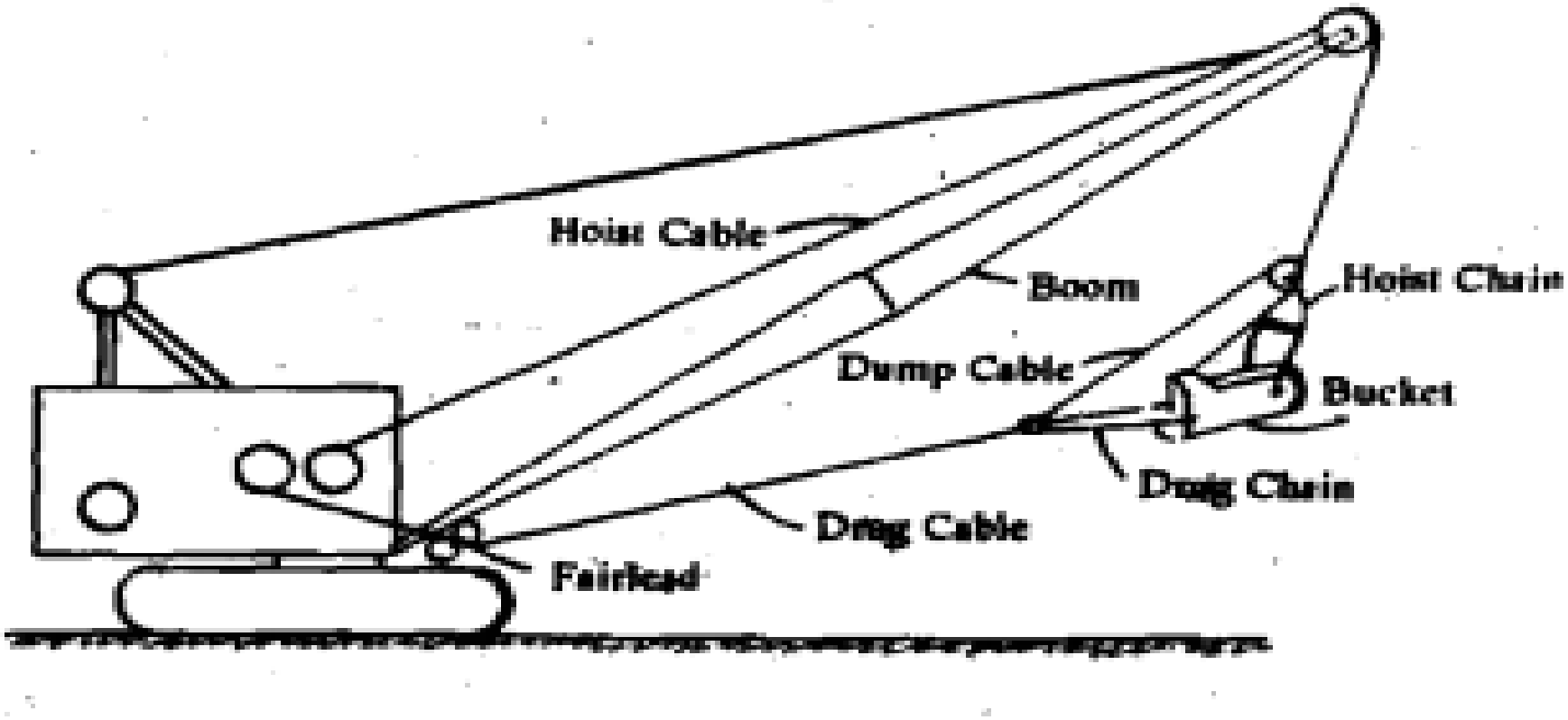
Draglines

- Draglines are used to excavate earth and load it into haul units, such as trucks or tractor-pulled wagons, or to deposit it on spoil banks and embankments near the place from where it is excavated.
- A power shovel can be converted into a dragline by replacing the dipper stick of the shovel with a crane boom and substituting a dragline bucket for the shovel dipper.
- Advantages of a dragline are:

1) It does not have to go into the pit to excavate,
2) 2) It can excavate below its level and under water,
3) 3) 'I'he trucks do not have to go into the pit nor contend with wet mud,
4) 4) A dragline with a long boom can dispose off the earth in one operation without the need for haul units, and
5) 5) It can excavate trenches without shoring.

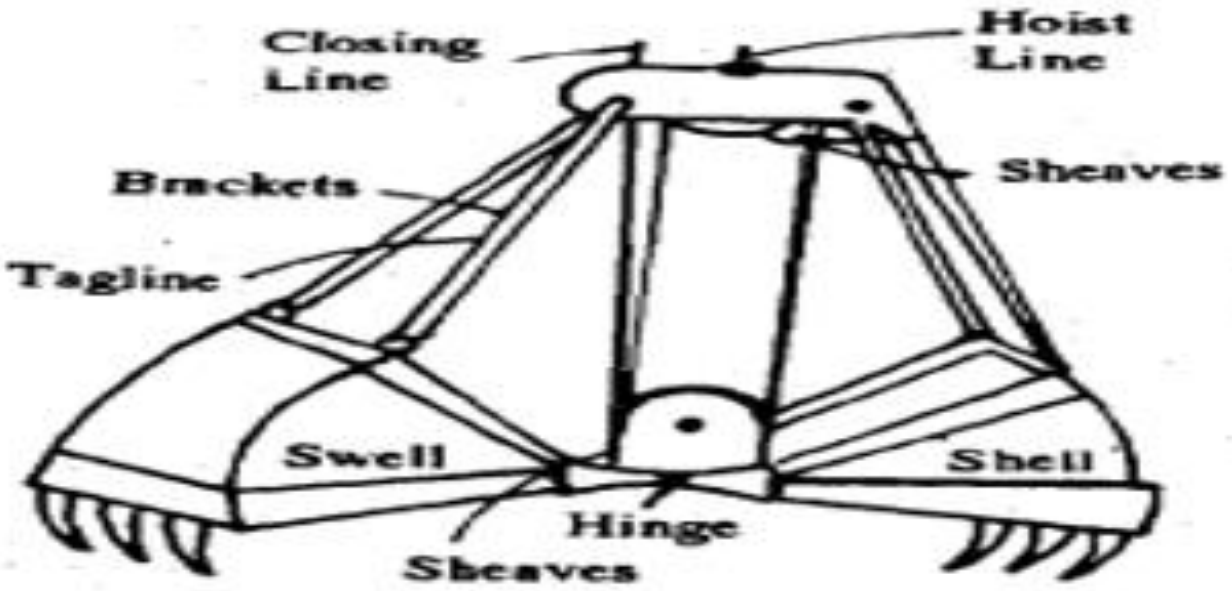
- One disadvantage of a dragline is that its output is only 75 - 80 8 that of a power shovel.

Draglines


Hoist Cable
Boom
Hoist Chain
Dump Cable
Bucket
Drag Chain
Drag Cable
Fairlead

CLAMSHELLS

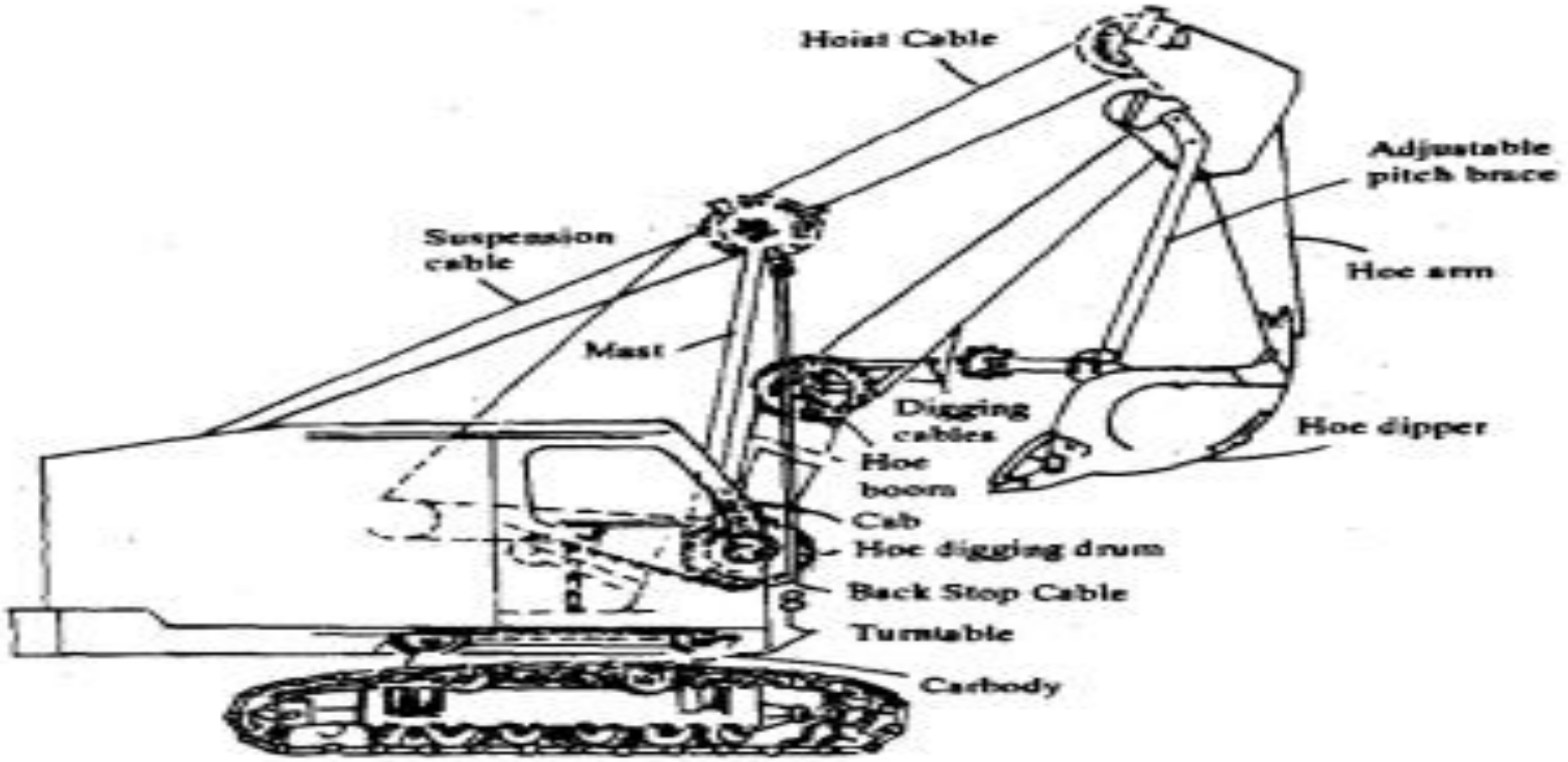
Clamshells are used primarily for handling loose materials such as sand, gravel, crushed stone, etc., and for removing materials from cofferdams, pier foundations, etc. They are especially suited to vertical lifting of materials from one location to another. The limit of vertical movement my be relatively large when they are used with long crane booms.



HOES

- The term hoe applies to an excavating machine of the power-shovel group It is referred to by several other names, such as, backhoe, back shovel, and pull shovel.
- A power shovel is converted into a backhoe by installing a dipper stick and a dipper at the end of the shovel boom.
- A hoe is frequently equipped with a gooseneck boom to increase the digging depth of the machine. Hoes are used primarily to excavate below the level at which the machine rests.
- They are adapted to dig trenches, pits and basements. Due to their rigidity they are superior to draglines in operating on close-range work hnd dumping into trucks. Because of the direct pull on the dipper, hoes may exert greaterrnth pressure than power shove

HOES

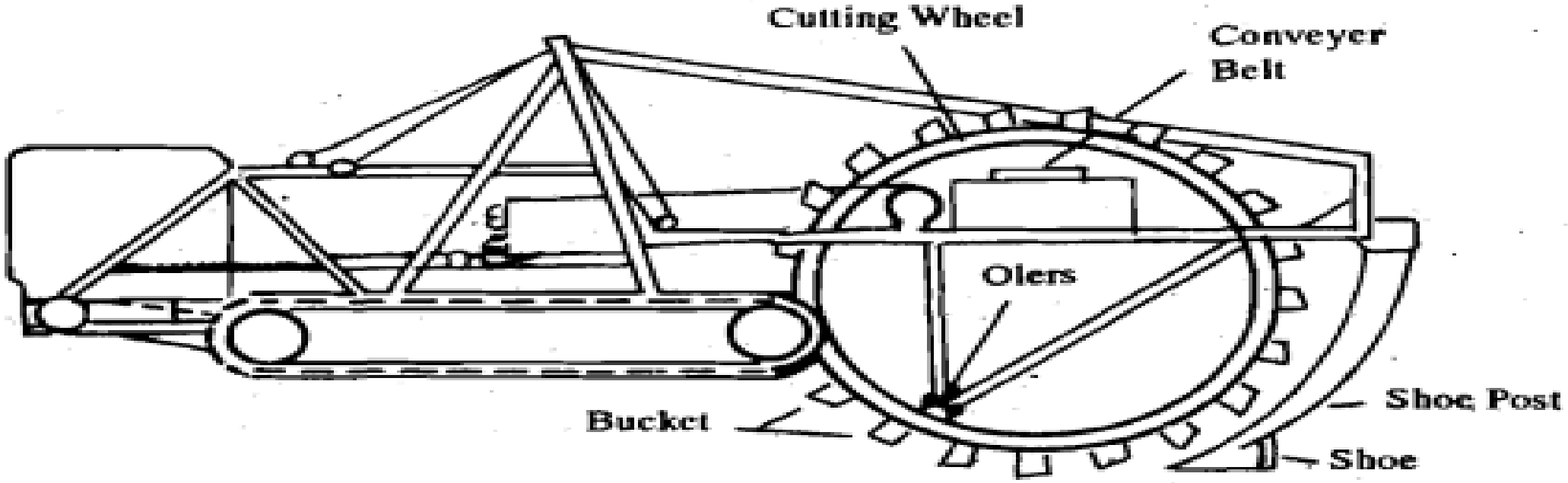

Hoist Cable
Adjustable pitch brace
Suspension cable
Hoe arm
Mast
Digging cables
Hoe dipper
Hoe boom
Cab
Hoe digging drum
Back Stop Cable
Turntable
Carbody

TRENCHERS

These machines dig utility trenches for water, gas and oil pipelines, telephone cables, drainage ditches and sewers. They provide fast digging, with controls of depths and widths of trenches. They can dig any type of material except rock. They are crawler-mounted to increase their stability. There are two types of trenchers: wheel-type trenching machine and ladder-type trenching machine.

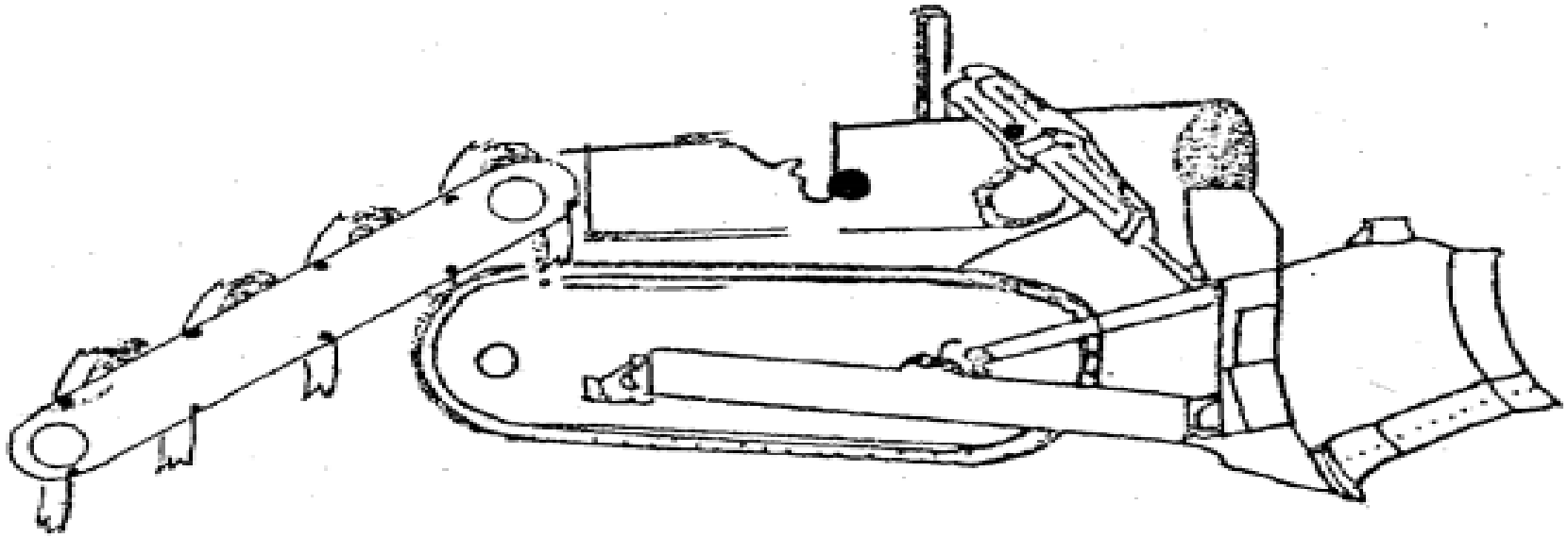
1. Wheel-type Trenching Machines

- They can dig widths from 0.3 m upto 1.5 m and maximum cutting depths of the order of 2.4 m The excavating part of the machine comprises a power-driven wheel, on which are mounted a number of removable buckets equipped with cutter teeth.
- The machine is operated by lowering the rotating wheel to the desired depth, while the unit moves forward slowly.
- The earth is picked up by the buckets and deposited on a belt conveyor, which can be adjusted to discharge the earth on either' side of the trench or into a tractor-pulled wagon.



2. Ladder-type Trenching Machine

The excavating part of the machine comprises cutter buckets attached to two endless chains, I that travel along the boom As the buckets travel up the underside of the boom, they bring , out earth and deposit it on a belt conveyor which discharges it along either side of the trench. As a machine moves over uneven ground, it is possible to vary the depth of cut bxr adjusting the position, but not the length, of the boom.



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STAY HOME, STAY SAFE