

CEL 774

– IIT DELHI

Construction RACTICES

(Lecture 4)

Concrete: Production

B. Bhattacharjee

CIVIL ENGINEERING DEPARTMENT

IIT DELHI



DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

General Outline

❖ Concrete Production.

- ⚙ **Ready mixed Concrete**

- ⚙ **Transporting Concrete**



B. Bhattacharjee

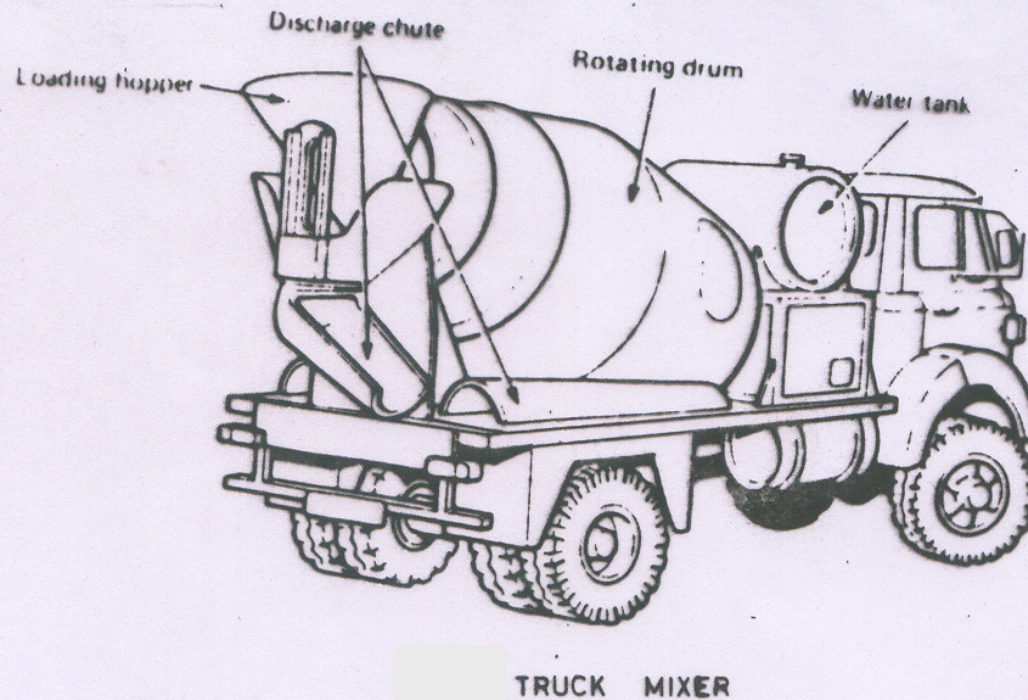
DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

Ready mixed Concrete

- *Ready mixed concrete production is a process, where by, mixing and transportation of concrete can be combined together and the product is delivered to the site, at times right in the mould straight away.*
- *IS-4926, the definition of Ready mixed concrete is: “Concrete delivered at site or in to the purchaser’s vehicle in a plastic condition and requiring no further treatment before being placed in position in which it is to set and harden”.*



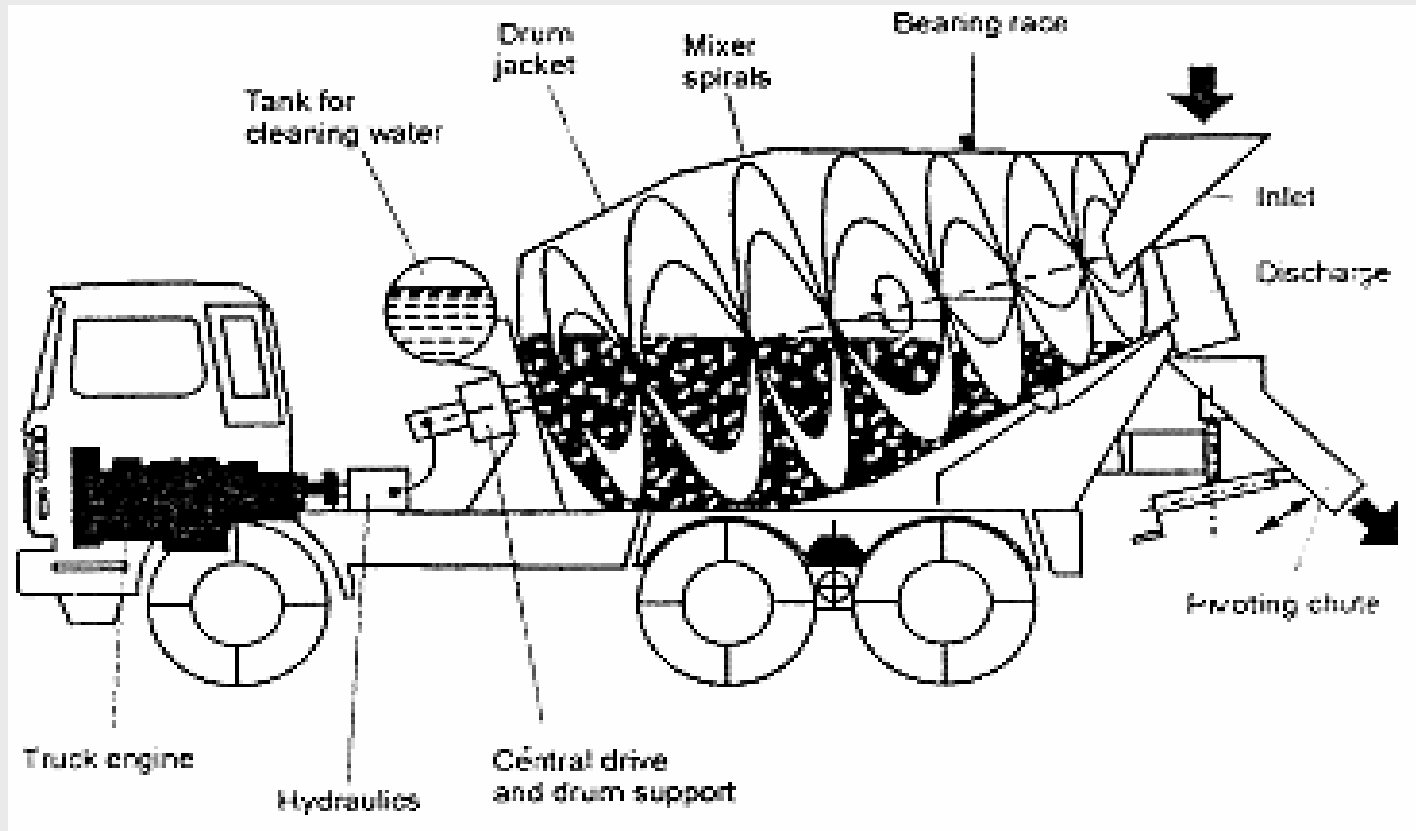
Truck Mixer



B. Bhattacharjee

DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

AGITATOR TRUCK



AGITATOR TRUCK



DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

AGITATOR TRUCK



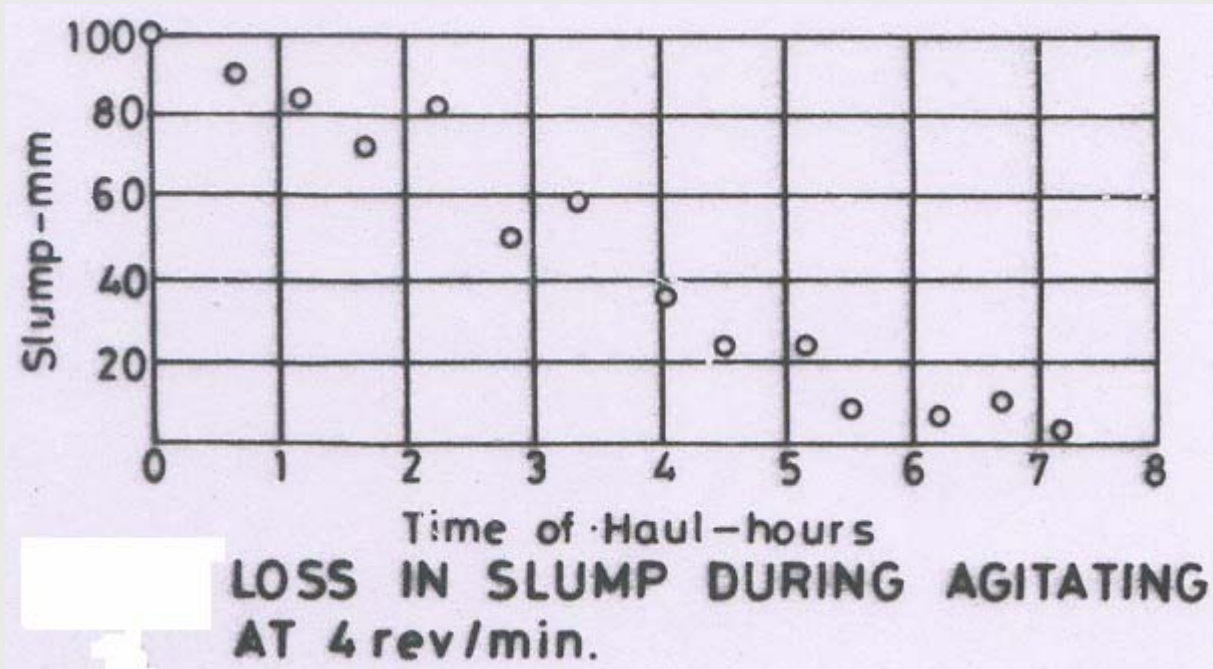
DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

Ready Mixed Concrete

- Uniformity and loss of slump are two major issues.***
- Time of haul is restricted to 1+ to 2 hours, also depends upon the ambient temperature, for higher ambient temperature the time of haul is lesser.***
- The maximum number of revolutions of the mixing drum is limited to 300 revolutions at agitating speed and that at mixing speed is 100.***



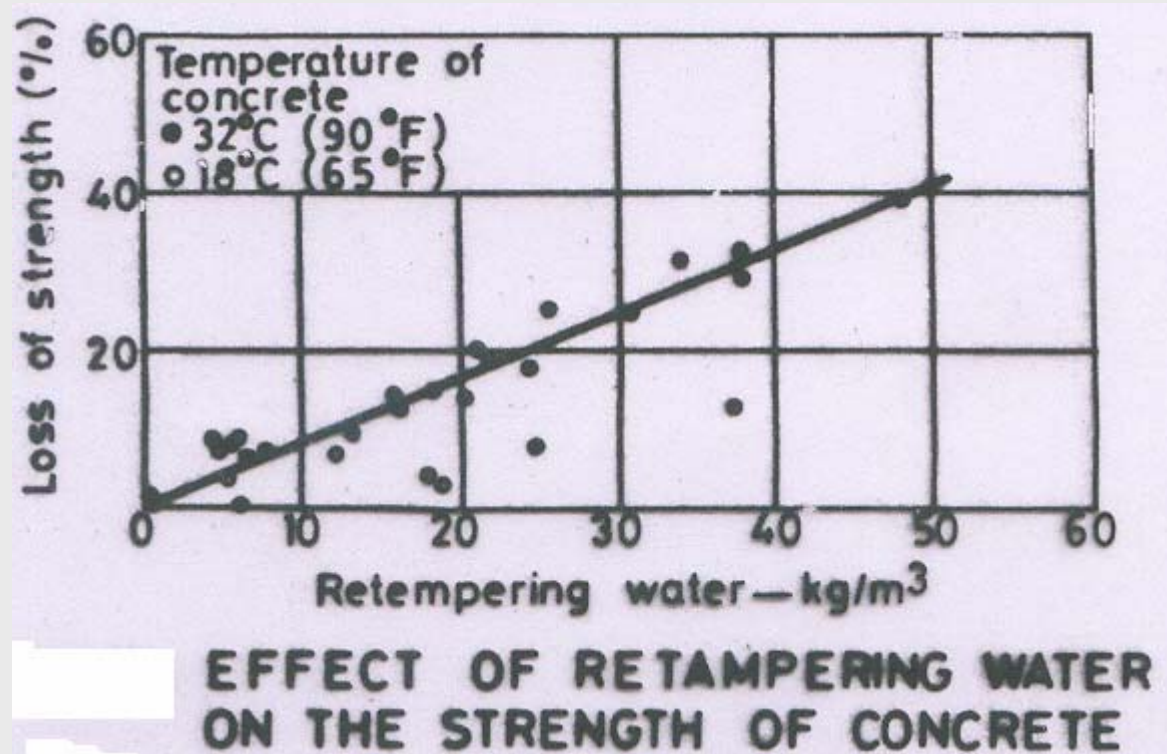
SLUMP LOSS in RMC



B. Bhattacharjee

DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

Strength loss in remixing



B. Bhattacharjee

DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

Transporting Concrete

- **Transporting:** concrete produced from a mixer is required to be transported to the forms for placing .
- This handling tends to produce segregation and loss of slump, if the distance is long.
- Methods of transporting and placing, which permit the use of drier mixes are better.



Transporting Methods

– methods of transporting and placing concrete which are used widely, are:

- Discharge directly in to forms through short chute or for a very small lead manually in containers.***
- By barrows: Wheel burrows and handcarts.***
- Power barrows or power buggies***
- Dumpers and trucks (agitating or non agitating)***



Transporting Methods

- ***Monorail system***
- ***Elevating towers and hoists***
- ***Skips operated by cranes or overhead cable ways***
- ***Belt conveyers and Boom conveyers***
- ***Truck mixers & Agitator Trucks***
- ***Tremie***
- ***Concrete pumps and pneumatic placers***
- ***Any combinations of above.***



Direct Discharge, Manual Transport in containers and Short Chutes

- Free fall of concrete over a height of 2m is to be avoided.***
- short chutes with proper lower end treatment are simple to use and economical.***
- metallic, half round in section, stiffened at places may last to handle about 1500m³ of concrete.***
- Long chutes are less desirable***

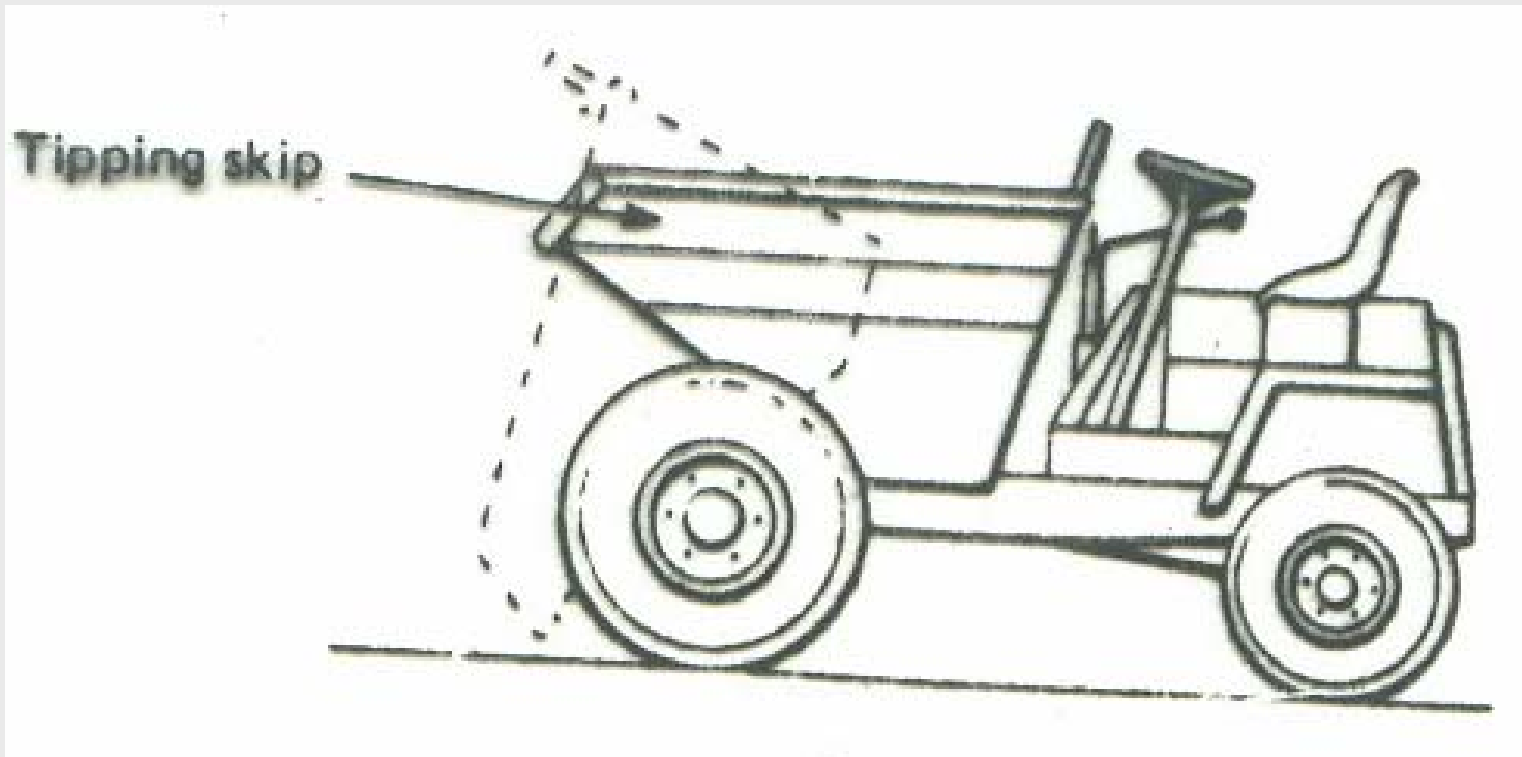


Burrows & Dumper trucks

- Manual wheel burrow capacity up to 80 kg of concrete.***
- Power Burrows up to 800 kg and 300m haul and can haul to a 20 % gradient.***
- Dumpers and Trucks (Horizontal transport) are used for long hauls. Because of the jolting on the ground, ordinary trucks and dumpers tend to cause segregation of concrete during transit.***



Dumper trucks



B. Bhattacharjee

DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

Monorail System

- *Monorail system needs a track and consists of a power wagon mounted on the single rail track, which can move at a speed of 80-90 m/min*
- *Segregation of concrete may take place due to jolting of concrete in the wagon over each rail joints, hence wet mix are generally unsuitable for monorail transport. when the rail track runs over the slab form, the wagon can directly discharge on the form.*

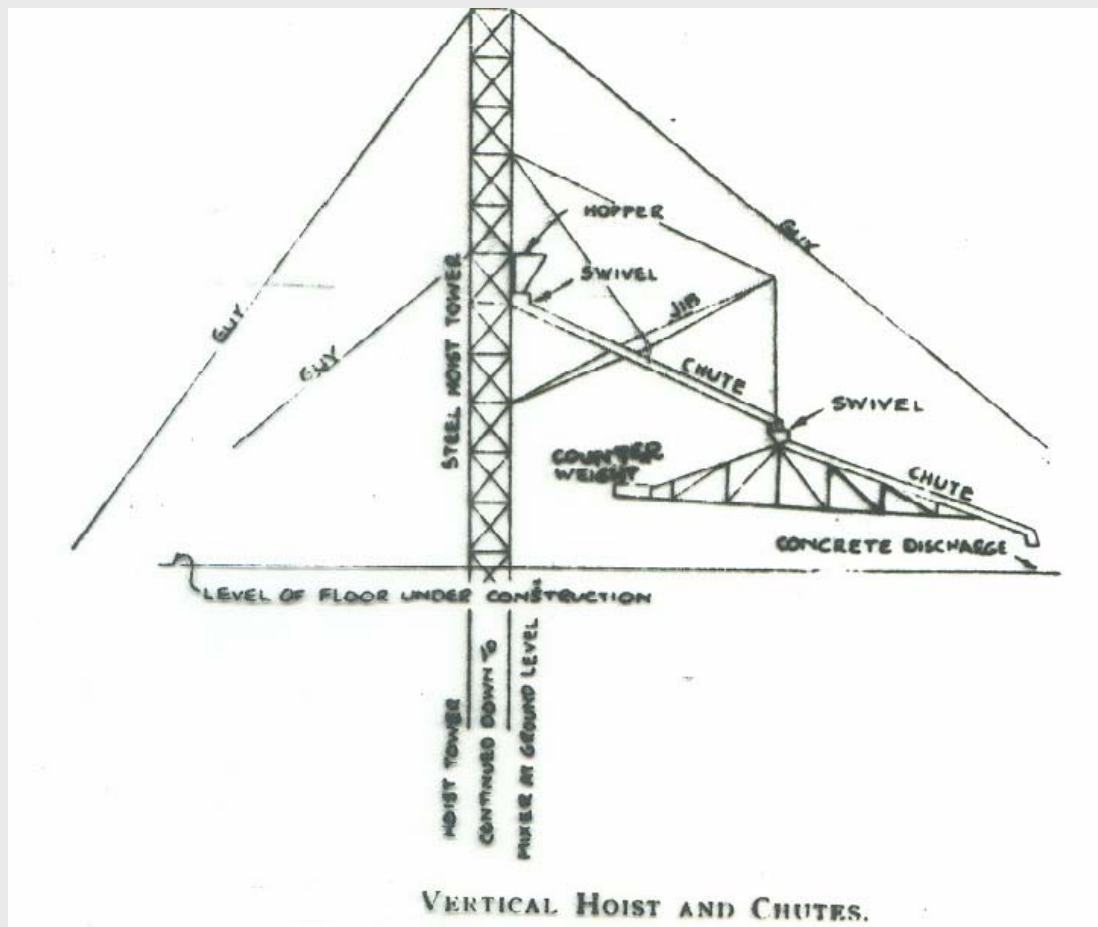


Elevating Tower and Hoists (Vertical transport)

- Elevating towers are used for lifting concrete buckets, which can be distributed using a chute or by other means such as barrows, etc.***
- Hoists operate on a similar principle. A cantilever platform hoist operates along a steel lattice mast.***
- Concrete skip can be used directly, that can tilt and discharge the concrete on some distribution system.***



Hoists (Vertical transport)



B. Bhattacharjee

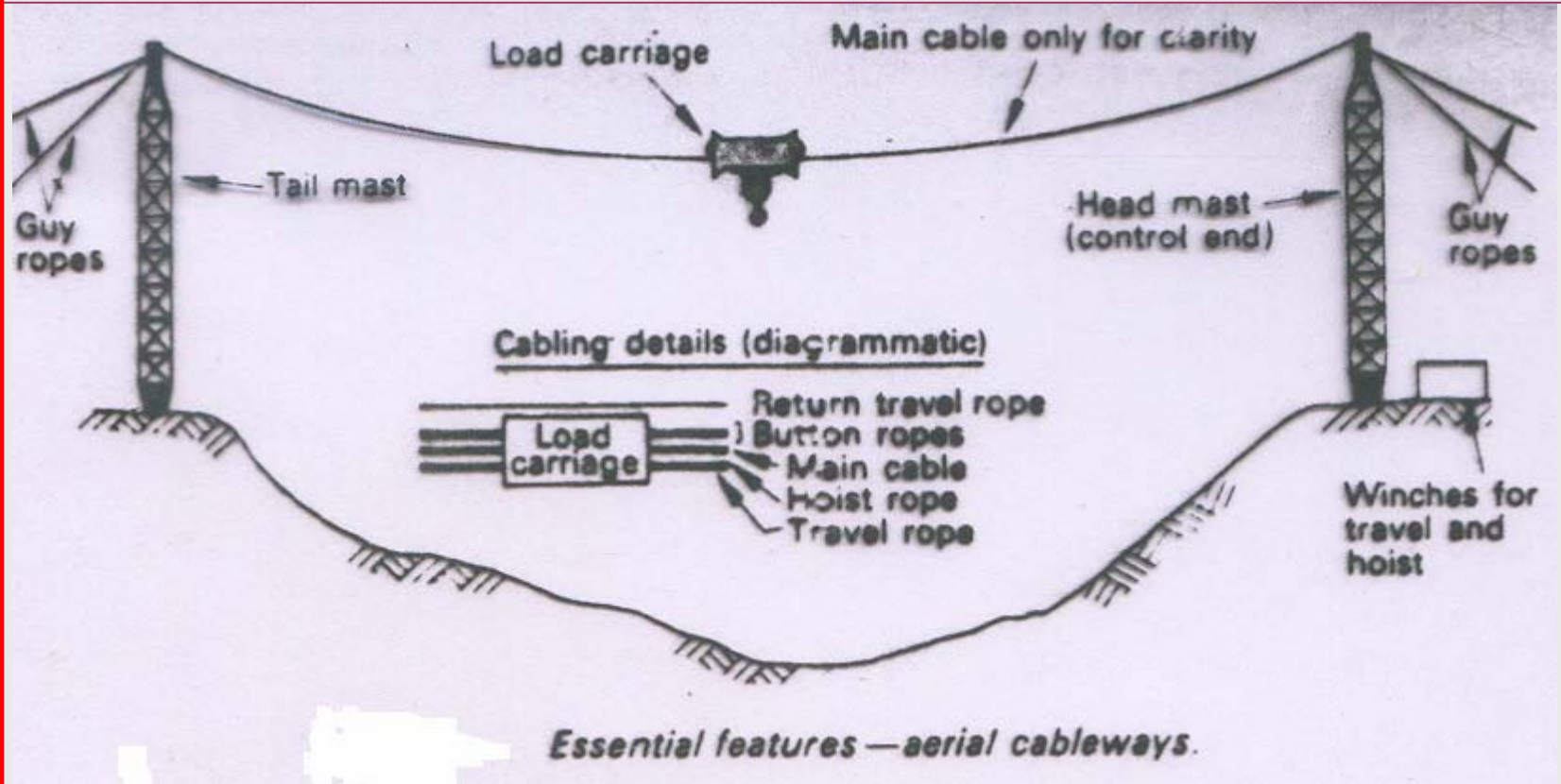
DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

Cranes and Cableway (Two or three dimensional transport)

- Cranes or cableways may be used for three dimensional transport of concrete. Cable way is useful in river valley projects. Cranes of various types are also useful in high rise building construction in congested sites.*
- Depending upon the site, cranes may be any one of the following types such as derrik crane, tower crane, crawler mounted, or wheel mounted, or a hydraulic crane*
- The main consideration in selecting the crane is height and radius of operation*



Cableway



Belt Conveyor

- *Belt conveyors needs small power.*
- *Discharge can be as high as 115 cubic m/hour on a narrow strip of belt The main consideration in selecting the crane is height and radius of operation.*
- *Conveying concrete through a limited elevation of 30 degree is possible.*
- *For wet mixes the capacity of the belt is reduced as the inclination through which concrete can be lifted is also lowered,*



Belt Conveyor

- *Concrete tends to segregate in steep inclines as the belt passes over the rollers, this problem is less acute in drier mixes. Segregation at the discharge point may be avoided using proper hopper and the chute arrangement.*
- *In case of a breakdown of machines, large amount of concrete in the belt needs removal by other means and the belt is to be cleaned and washed.*
- *Their initial cost of setting up is also high.*

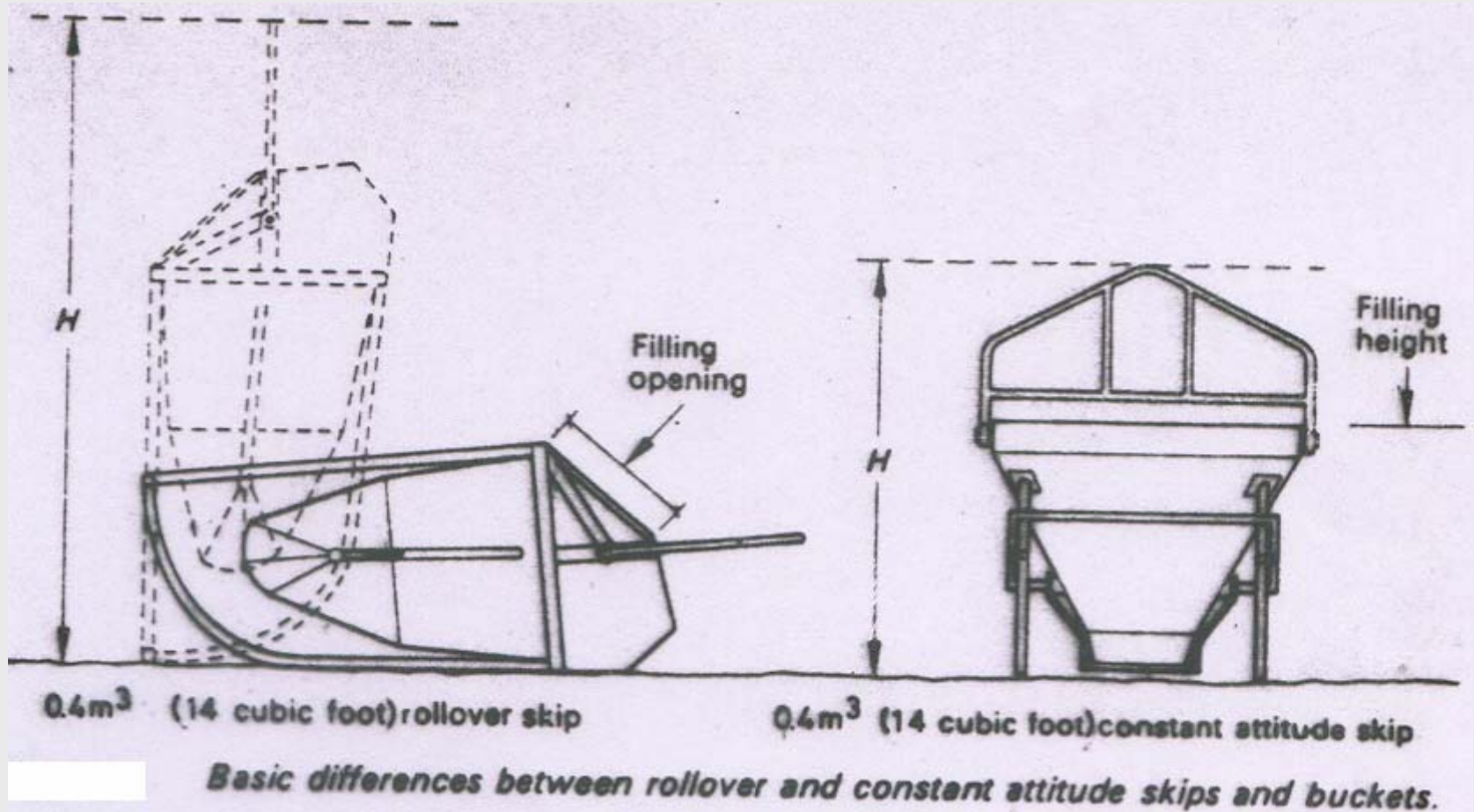


Concrete Buckets or Skips

- 1) *Roll-over and 2) Constant altitude type*
- *The capacity of skip may vary from 0.2 m³ in small jobs to 10 m³*
- *The control of discharge is obtained from good design in terms of shape of the gate for proper flow. The ease of filling and resistance to wear and tear are other aspects of good design*
- *Buckets are also used for under water concreting,*



Buckets or Skips



B. Bhattacharjee

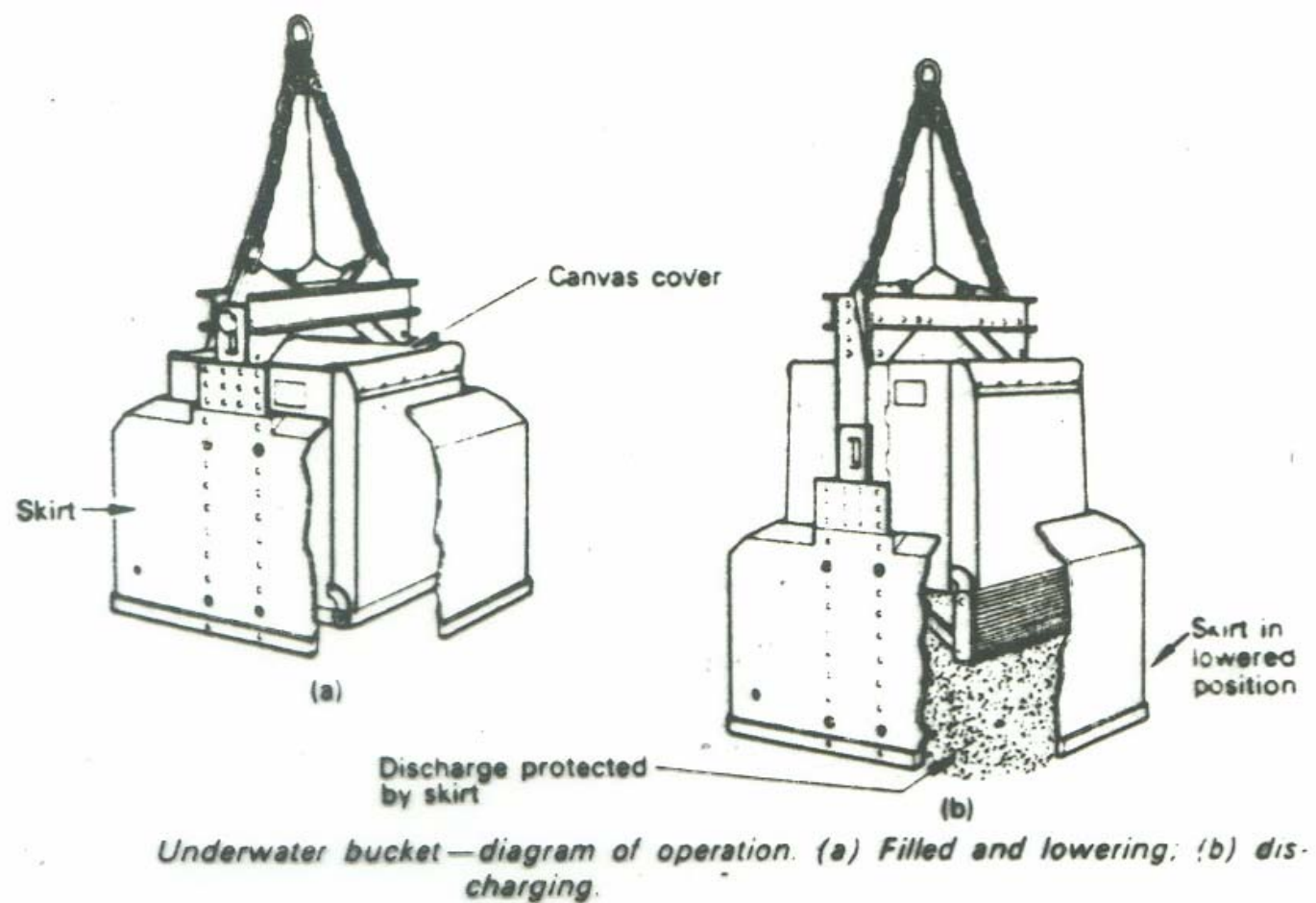
DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

Under water Concreting

- *Under water placing of concrete poses a number of problems, as concrete cannot be compacted and concrete cannot be compacted and concrete may get mixed with water. Whenever, possible under water concreting, is to be avoided.*
- *To overcome the problems mentioned above, concrete must be self compacting and wet enough to flow under its own weight, and must be placed with least disturbances.*
- *1)pre packed or grouted concrete 2) Tremie or bucket 3) Pumping 4) Dumping by bags.*



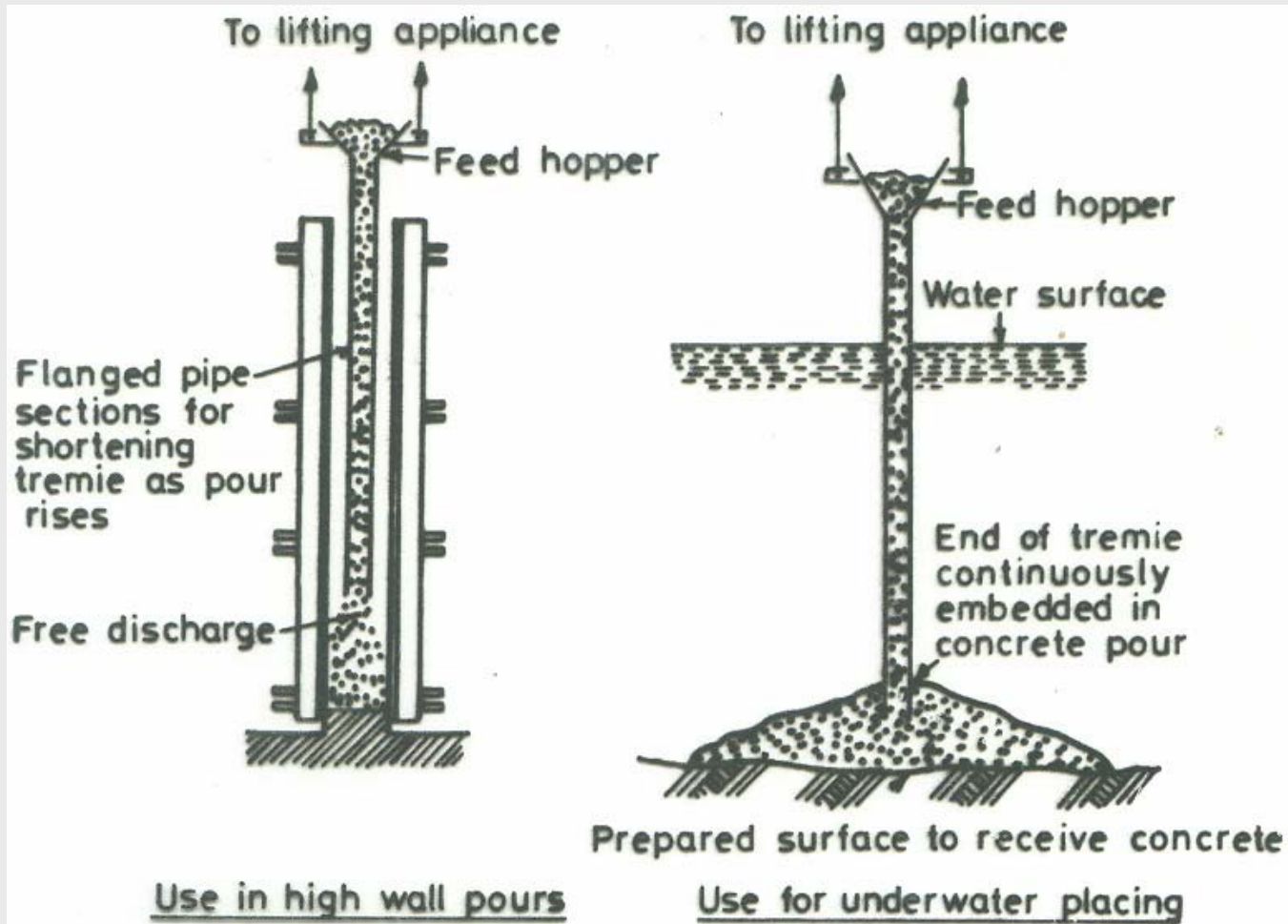
Under water Buckets



B. Bhattacharjee

DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

Tremie



B. Bhattacharjee

DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI

SUMMARY

- Transport of Concrete***
- Ready Mixed Concrete***



***THANK YOU FOR
HEARING***



DEPARTMENT OF CIVIL ENGINEERING, IIT DELHI