

5.3 MIXING EQUIPMENT

Standard Type Dumper Crane Skip Dumper

Ready mixed Concrete Trucks

These are used to transport mixed concrete from a mixing plant or depot to the site. Usual capacity range of ready mixed concrete trucks is 4 to 6 m³. Discharge can be direct into placing position into some form of site transport such as dumper, crane skip or concrete pump.

Concrete Pumps

Details of Concrete Pumps

These are used to transport large volumes of concrete in a short time (say up to 100 m³ per hour) in both the vertical and horizontal directions from the pump position to the point of placing. The pump is supplied with pump able special concrete mix or with constant flow of ready mixed concrete Lorries throughout the pumping period. Bore pipeline (100 mm diameter) and can be trailer or lorry mounted. Pumping ranges may be up to 850.00 in vertically and 200 in horizontally depending on the pump model. It generally requires about 45 minutes setting up a concrete pump on site including coating the bore of the pipeline with a cement grout before pumping. After plumbing, the pipeline should be cleared and cleaned. Usually concrete pump and operator are hired for the period required.

Concrete Mixers

Details of Concrete mixers

Types of mixers are generally related to their designed output performance.

Machines are decided based upon what mixing and placing methods are to be employed to mix and place a certain amount of concrete in a given time period. Generally, a batch mixing time of 5 minutes per cycle of 12 batches per hour can be assumed as a reasonable basis for assessing mixer output. Small Batch Mixers have outputs up to 200 liters per batch with wheel barrow transportation on hourly placing rate of 2 to 3 m³ can be achieved. Most small batch mixers are of the tilting drum type. Generally these mixers are hand loaded which makes the quality control of successive mixes difficult to regulate. Medium Batch Mixers have output ranging from 200 to 750 liters. Low output machines are available as tilting drum mixers and high output ones are available as non-tilting drum mixers. Non-tilting mixers are either reversing drum or chute discharge, the latter usually having a lower discharge height. Such mixers usually have integral weigh batching facility loading hoppers. Scraper shovels and water tanks thus giving better quality control than the small batch mixers.

Generally they are unsuitable for wheel barrow transportation because of their high output.

CONSTRUCTION EQUIPMENT

The selection of the appropriate type and size of construction equipment often affects the requirement amount of time and effort and thus the job-site productivity of a project. It is therefore important for site managers and construction planners to be familiar with the characteristics of the major types of equipment most commonly used in construction. L Excavation and Loading One family of construction machines used for excavation is broadly classified as a crane-shovel! As indicated by the variety of machines in Figure 4-3. The crane-shovel consists of three major components:

- A carrier or mounting which provides mobility and stability for the machine.

- A revolving deck or turntable which contains the power and control units.
- A front end attachment which serves the special functions in an operation.

The type of mounting for all machines in Figure 4-3 is referred to as crawler mounting which is particularly suitable for crawling over relatively rugged surface at a job site other types of mounting include truck mount and wheel mounting which provide greater mobility between job sites, but require better surfaces for their operation. The revolving deck includes a cab to house the person operating the mounting and the revolving deck. The types of front end attachments in Figure 4-3 include a crane with hook, clam shell, dragline. Backhoe, Shovel and pile driver. A tractor consists of a crawler mounting and a non-revolving cab. When an earth moving blade is attached to the front end of a tractor, the assembly is called a bulldozer. When a bucket is attached to its front end, the assembly is known as a loader or bucket loader. There are different types of loaders designed to handle most efficiently materials of different weights and moisture contents. Scrapers are multiple-units of tractor-truck and blade-bucket assemblies with various combinations to facilitate the loading and hauling of earthwork. Major types of scrapers include single engine two-axle or three axle scrapers, twin-engine all-wheel-drive scrapers, elevating scrapers. And push-pull scrapers. Each type has different characteristics of rolling resistance, maneuverability stability, and speed in operation.

Compaction and Grading

The function of compaction equipment is to produce higher density in soil mechanically. The basic forces used in compaction are static weight. Kneading, impact and vibration. The degree of compaction that may be achieved depends on the

properties of soil, its moisture content, the thickness of the soil layer for compaction and the method of compaction. Some major types of compaction equipment with different operating characteristics.

Concrete Vibrators

Details of Concrete Vibrators

Poker or Internal Vibrators

These consist of a hollow steel tube casting in which is a rotating impeller which generates vibrations as its head comes into contact with casing. Poker vibrators should be inserted vertically and allowed to penetrate 75mm into any previously vibrated concrete.

External Clamp or Tamping Board Vibrators

These vibrators operate by shaking the formwork. Clamp vibrators powered by either compressed air or electricity whereas tamping board vibrators are usually petrol driven. Formwork must be stronger than is traditional to withstand vibration. The function of grading equipment is to bring the earthwork to the desired shape and elevation. Major types of grading equipment include motor graders and grade trimmers.

Drilling and blasting

Rock excavation is an audacious task requiring special equipment and methods. The degree of difficulty depends on physical characteristics of the rock type to be

excavated such as grain size planes of weakness. Weathering, Brittleness and hardness. The task of rock excavation includes loosening, loading, hauling and compacting. The loosening operation is specialized for rock excavation and is performed by drilling, blasting or ripping. Major types of drilling equipment are percussion drills, rotary drills- and rotary- percussion drills. A percussion drill penetrates and cuts rock by impact while it rotates without cutting on the upstroke. Common types of percussion drills include a jackhammer which is hand-held and others which are mounted on a fixed frame or on a wagon or crawl for mobility. A rotary drill cuts by turning a bit against the rock surface. A rotary-percussion drill combines the two cutting movements to provide a faster penetration in rock. Blasting requires the use of explosives, the most common of which is dynamite. Generally, electric blasting caps are connected in a circuit with insulated wires. Power sources may be power lines or blasting machines designed for firing electric cap circuits. Also available are nonelectrical blasting systems which combine the precise timing and flexibility of electric blasting and the safety of non-electrical detonation. Tractor-mounted rippers are capable of penetrating and prying loose most rock types. The blade or ripper is connected to an adjustable shank which controls the angle at the tip of the blade as it is raised or lowered. Automated ripper control may be installed to control ripping depth and tip angle. In rock tunneling, special tunnel machines equipped with multiple cutter heads and capable of excavating full diameter of the tunnel are now available. Their use has increasingly replaced the traditional methods of drilling and blasting.