Chapter 11

Concrete Equipment

Military engineers should be familiar with the different types of concrete equipment, their capabilities, and their employment procedures. Operators and maintenance crews must enforce the basic principles that apply to each piece of equipment.

CONCRETE MIXER

11-1. The 16S concrete mixer is a self-contained unit that produces a 16-cubic-foot batch of concrete, plus a 10 percent overload. The hourly production rate varies between 10 and 15 cubic yards depending on personnel efficiency. The mixer consists of a frame, wheels, a towing tongue, an engine, a power-loader skip, a mixing drum, a water tank, and an auxiliary water pump. A concrete mixer can also be used as a central mixing plant. Aggregate that is larger than 3 inches will damage the mixer. The 16SM concrete mixer can also mix mortar.

PNEUMATIC CONCRETE VIBRATOR

11-2. The pneumatic concrete vibrator, which is available in two sizes, is a table of organization and equipment (TOE) item and a Class IV item in some units. The small vibrator has a 17 3/4-inch tube that is 2 1/2 inches in diameter, and the large vibrator has a 21 5/8-inch tube that is 3 inches in diameter. The power for both units is supplied by a five-lane, rotary air motor. A flexible, bonded, rubber coupling between the air motor and the unbalanced rotor eliminates the transmission of shock loads between rotating parts.

11-3. Radial ball bearings at each end of the unbalanced rotor carry the rotating load and facilitate proper assembly of the vibrator. A specially carbonized, hardened, steel-casing tube resists the outside wear. The tip is covered with a long-wearing, satellite material. The vibrator operates at 80 psi and produces 8,500 to 9,000 vibrations per minute. The small unit is used on concrete with a slump over 3 inches, and the large unit is used on concrete with a slump under 3 inches.

11-4. The vibrator on the spreader is effective to a depth of 12 inches, and internal vibrators consolidate an area that is about 36 inches in diameter. Only one type of vibrator can be used at a time. Be careful when vibrating an air-entrained mix; some vibration is necessary, but overvibration can cause a loss of entrained air.
CONCRETE SAW

11-5. A concrete saw is used to cut longitudinal and transverse joints in finished concrete pavements. Several types of blades are available, and the most common ones have diamond or carbide cutting surfaces. A diamond blade is used for hard cutting, and a carbide blade is used for cuts after the aggregate has been displaced by vibration. A concrete saw is small and can be operated by one man. Once the cut has been started, the machine provides its own tractive power. A water spray flushes the saw cuttings from the area and cools the cutting blade.

PIN PULLER

11-6. Several types of pin pullers are available. One type consists of a lever and a fulcrum. One end of the lever clamps onto the head of a pin. Pressure is applied to the other end of the lever, and the action over the fulcrum exerts sufficient force to remove the pin. Another type of pin puller has a peavey handle with a clamp connected to it.

WATER HEATER

11-7. A water heater is available as Class IV equipment. It consists of a vaporizing burner with kerosene and water tanks. The heater can raise the temperature of water by 100°F at a rate of 800 gallons per hour. It is used to heat water for concrete operations during cold weather. Chapter 13 contains additional information on using a water heater.

![WARNING]

Never allow the water to exceed 175°F because a flash set may occur when the water is added to the concrete mix.

CONCRETE BUCKET

11-8. Concrete buckets are available in sizes from 2 to 34 cubic yards as standard TOE and Class IV supplies. They are normally used to place structural concrete. Most of the buckets are cylindrical with a clamshell door at the bottom that can be hand-operated. Buckets are normally used with a crane.

11-9. Buckets can be easily constructed in the field. Well-designed expedient buckets work better than standard buckets when transferring mix from a 5-ton dump truck to pavement forms. A scoop loader (front-end loader) with a 4-in-1 bucket works very well as an expedient concrete bucket if it can maneuver alongside the forms and the slab is not too wide.

SUPPORTING EQUIPMENT

11-10. Cranes, finishing tools, water pumps, and shovels are necessary in concrete construction. Each job is unique and should be treated as such when planning for equipment use. Before starting an operation, analyze the job and
its equipment requirements, including supporting equipment. Although expedients may be substituted for most pieces of supporting equipment, having the correct tool for the job greatly improves the efficiency of the project.

**CENTRAL MIX PLANT**

11-11. A central mix plant has facilities to handle, store, batch, and mix concrete materials. The batcher discharges directly into the mixer, and the mixer discharges the concrete into the hauling unit, which transports the concrete to the construction site. A central mix plant rigidly and accurately controls the water-to-cement ratio, the aggregates' moisture content, and the concrete's consistency. It also provides centralization of responsibility. There are no central mix plants in the Army's system, but two 34E pavers can be used as a central mix plant.

11-12. A central mix plant should be located so that the mix can be placed within 30 minutes. The site should be level and have good drainage. A sidehill location is usable if there is an adequate working area around the mixers. However, a retaining wall must be constructed to support the wall of the truck-loading well, and a sump must be located against the retaining wall to drain the well. The working and storage areas should be paved if the plant will be used over an extended period of time.

11-13. Water is a critical item for a central mix plant, and locating a water source is a primary factor in site selection. If water is not available at the site, it can be brought in by a truck or a pipeline (a pipeline is the best solution). The water point should be located so that truckbeds can be thoroughly cleaned before they are filled with concrete. A good road network is also a primary factor in site selection. In most cases, fair-weather roads are acceptable. Concrete paving operations are usually suspended before bad weather makes unimproved roads impassable.

**M919 CONCRETE MOBILE**

11-14. This is a mobile concrete plant that is mounted on an M919 truck chassis. The mixer carries enough material to produce up to 8 cubic yards of concrete. The unit can be used on an intermittent or a continuous basis; however, a continuous operation depends on the availability of materials at the site. Control settings for mix operation of the M919 vary from truck to truck and from site to site.