Chapter 3
Transportation of Equipment to the Site

Actual transportation of the equipment is usually not the responsibility of the installers. However, they may sometimes be called upon to advise. Transportation of the equipment to the site also includes proper packing, planning the transportation, and storage at the site until installation is complete. Packing is an important part of the process. It should ensure that the equipment is protected from the effects of weather; that pilferage, loss, and damage during transportation and storage are minimised; and that the equipment is easy to carry. In most cases, the equipment will have to be carried manually for anything from a few metres to many kilometres (in Nepal it could mean a walk of a few days). Therefore, the packages have to be of appropriate size and weight. An experienced and trained porter can carry up to 60 kg for long distances on a mountain trail; and a horse or mule can carry up to 80 kg. But this would also depend on how difficult or dangerous the trail is (steepness, width, slipperyness). Many components (e.g., penstock pipe sections) need not be wrapped, while others, like the generator, have to be wrapped in polythene sheets or similar material to protect them from rain. Smaller items should be packed together, others (e.g., the turbine) may have to be disassembled and packed or they will be too heavy to carry. The penstock and other items more than three metres long may also be difficult to carry. All these aspects should be given due consideration when planning the packaging and transportation. Disassembled parts of items may have to be marked so that they can be correctly reassembled later.

It is usually expensive and inconvenient to pack larger units, such as the generator and turbine, in wooden cartons. However, smaller and delicate items, such as electrical instruments, electronic load controllers (ELC), switches, and insulators for transmission, may be packed in wood or cardboard cartons using adequate anti-impact material such as foam and plastic sheets or similar materials to protect them from rain. In some countries, e.g., Nepal, the traditional method of carrying a heavy load is on the back; whereas in Pakistan, for example, people carry packages on their heads. The maximum dimensions suggested for packages to be carried by these different methods are as follow.

Carrying method	Suggested Maximum Dimensions (cm)		
	Length	Width	Height
On the back	50	50	120
On the head	50	50	40

Heavier and larger packages should be carried on the back if experienced porters can be found. Sometimes, heavier items can also be carried by two or more persons by fastening the item to a wooden pole of appropriate thickness which is supported on the shoulders. In this way, heavier loads (up to 100 kg) can be carried by two people. Table 2.1 shows the average maximum sizes and weights that can be carried by a single person or animal and by other transport systems.

Table 2.1: Permissible Weights for Transportation of Goods

Mode of Transport	Carrying Capacity	Remarks
Porter	60	On back
Horse	80 kg	30 kg each side
Mule	40 – 60 kg	30 kg each side
Truck	8 – 10 tonnes	Up to 5 one tonne units if crane available for loading
Helicopter	0.5 – 4 tonnes	Depends on type
Plane	2 – 10 tons for hilly areas	Depends on type

3.1 Storage at the Site

Usually, it is necessary for equipment and other materials (e.g., cement) that have been transported to the site to be stored there for some time. An appropriate location has to be found for this purpose. Some items must be stored indoors under lock and key, while other heavier equipment can be kept outside but properly covered. Items, such as penstock pipe lengths (flanged or unflanged), can be stored outside but preferably covered with waterproof sheets. If possible and safe, the heavier equipment may actually be stored at the site (e.g., penstock, turbine, generator, trash racks); while other lighter, more delicate, and expensive items should be stored at another place inside, for example, in a house or school (e.g., the ELC, control panel, transmission wires, insulators). Special attention should be paid to the storage of cement since it can go hard in even a few days if exposed to excessive humidity. Cement should be properly wrapped in plastic sheets during transportation and indoor storage.

The following factors should be considered when selecting a storage site and storing the equipment and materials.

- Adequate space must be available both indoors and outdoors.
- The place should be as near to the actual site of installation as possible to avoid extra expenditure and possible damage resulting from repackaging and transporting.
- There should be no possibility of pilferage or damage by trespassers, or of damage as a result of rain, snow, animals, falling rocks, landslides, or other eventualities.