

Prestressed Concrete

Notes by-

Pravin S Kolhe,

BE(Civil), Gold Medal, MTech (IIT-K)

Assistant Executive Engineer,

Water Resources Department,

www.pravinkolhe.com

Transportation and Handling Techniques:

Er. Pravin Kolhe
(B.E Civil)

The basic requirement of any scheme for the mechanical handling of materials, products or components is that vertical or lateral movement of material should be minimised within the requirement of the manufacturing process.

(B1)

The scheme should reduce to a minimum the amount of effort required by the operatives engaged in the manufacturing process, and the method used should where possible, be capable of being operated or supervised by semi-skilled operatives.

The aim of the precaster is to devise a system requiring the minimum amount of handling of precast units between manufacture and delivery.

~~The~~ Prefabricated components - and, more particularly, precast units are economical only if they can be transported and erected at a cost which in combination with the cost of the manufacture of the components, is significantly below the cost of in situ (conventional) construction.

Econ. Economical and transport and erection have become possible as a result of the tremendous progress of the mechanical industry. A wide range of facilities is now available. Essentially, there are two forms of transport, by road and rail.

Road Transport:

Road transport is the more important of the two, for the simple reason that a large proportion of the building sites are accessible by road only.

Road Transport must conform to the legal requirements regarding vehicles and their loads, more particularly with reference to the maximum width and height of the loads and, in some cases, also the length, weight and number of the units conveyed. In this way, the transport problem controls the design of the precast components. There is no point in manufacturing structural units that cannot be conveyed. There is no point in manufacturing structural units that cannot be conveyed from the factory to the site where they have to be erected. In different countries, the rules for width of road-hauled loads are varying.

The headroom under bridges and such like structures is usually 4.5 m, but on many roads there are bridges with much less headroom. This means that the dimension of the precast unit, placed on edge, must not exceed 3.8 to 4.0 m, as the construction height of the low loader vehicle is usually about 50 to 60 cm.

Individual units must not exceed about 30 m in length. With regards to this, too, exception may be permissible. Such length may occur in the case of linear components such as beams and columns.

Regulations as to maximum weight of individual units vary from one country to another. The vehicles used for the transport of precast units will depend upon the type and size of the unit concerned.

Flat units such as roof and wall panels are transported on low loaders. Such vehicles have load capacities upto about 250 tons.

As a rule, all-wheel steering is provided and the trailers are manoeuvrable in both directions. A welded

frame structure transmits the load to the wheels. For the transport of wall panels it is advantageous to employ articulated vehicles which are fitted with special frameworks for supporting and securing the precast units. Long, heavy units may have to be transported with the aid of two bogies which are interconnected only by the precast unit itself.

Smaller precast units may also be conveyed on ordinary lorries (trucks), but in general, it will be preferable to use low-loading trailers. The advantage is that transport can then be so organised that waiting time for the towing vehicle can be eliminated.

Rail Transport:

Rail transport is always to be preferred in cases where the precasting works and also construction site, where the components are to be erected, have rail access. If this requirement is not fulfilled then transport by rail may be advantageous only if long distances have to be travelled. Transfer of loads from rail to road vehicles is always expensive, especially if the goods station is not equipped with its own crane. For such cases it is necessary to use two cranes — one for transferring the components from the railway to the road vehicle, and other for unloading them from the ~~latter~~ latter on arrival at the site. An alternative method is to use special railway vehicles which can be converted into trailers for road haulage. The clearance gauges (headroom) for rail transport are very similar to those for road transport.

Attachment and Fixation Applications

Points to be noted during Transportation:

Transport regulations set out conditions of axle loadings and these demand care in positioning certain components. For the more critical units a drawing should be prepared which indicates the position and level of the pads which actually come into contact with and support the structural units. Vehicles should be fitted with frames and supports appropriate to the load, and either steel, timber or concrete frames should be provided for particular shapes of components.

> Wherever possible, attachment to the vehicle should be made by screw-jacks or fastening with a positive locking or anti-rotational device. The elementary precaution of ensuring that the unit is coupled directly to the vehicle frame and not to an adjacent unit can save endless problems in transit by eliminating movement in the bed.

Some

> Where there is projection, the load should be arranged in such a way that the driver has a clear view of the projection from his cab and, of course, the statutory arrangements regarding advice of journey and provision of assistance to the driver must be observed.

Long units are frequently moved on turntable vehicles used in conjunction with multi-wheeled bogies. To turn a corner, the assistant driver steers the end supported on the bogie by means of mechanical or hydraulic controls, in this way the turning circle of the rig is reduced so that longer load can negotiate roundabouts and turns otherwise impossible with rigid vehicles.

4
→ Further, in case of multi-wheeled bogies, it is essential that ~~longer~~ the tie between the bogies and the unit should be mechanically perfect. Rather than using chains to make the connection it is desirable that substantial tie bolts should be employed in conjunction with channel beams to provide a clamping action on the unit. Driver and mate should be well versed in the procedure to be adopted at turns and they must also be aware of the area swept by any projection as the load moves round a bend.

(53)
→ All routes must be surveyed for features such as projecting buildings, telegraph lines and netting, obstacles likely to be the cause of accident; special care should be taken over road cambers and bridges, both from the point of view of the balance of the load and clearances.

→ Even the simplest loads will need inspection to ensure that any possibility of the load moving in transit is ruled out - and the driver should check the load regularly in the course of a long journey.

A few simple precautions can save endless trouble and expense.

(a) The ~~flat~~ flat body of the vehicle should be always swept clear of concrete particles.

(b) Projections should be visible from the cab.

(c) Clean, regular shaped battens should be used in stacking.

(d) The driver must check the load at time of acceptance and throughout the journey.

(e)

© The driver should ~~not~~ be instructed in protecting loads from possible damage due to chains and shackles.

Ⓕ The load should rest on properly designed stillages.

Ⓖ The normal principles of positioning and careful placing of battens should be observed.

* Unloading at Site :-

At the time of unloading at site it is suggested that a skilled banksman carries out the unloading operations of slinging and directing crane movements. The driver can unchain and unbolt units and sweep away small stones and dust but it is essential that the actual offloading is skillfully handled.

The crane hook must be correctly positioned, the ladders or slings properly adjusted and the 'lift' made such as to avoid slewing of the load which may damage the unit or vehicle.

Articulated vehicles can present problems on site particularly where there is any difficulty of access or where road conditions are bad. As they are without driven wheels, the trailers of articulated vehicles can quickly become bogged down and cause delay to subsequent operations, both with regards to transport and erection.