

Box culverts

Installation Guide



Marshalls

Civils & Drainage

Handling

Ensure that adequate capacity craneage is available on site to off-load and lay the culvert, as the units weigh between 2 Tonnes and 16 Tonnes each depending on size.

Where possible culverts are delivered as installed so that no turning operations are required on site. Typically these culverts have four threaded sockets cast in the top slab to accommodate threaded wire cable lifting loops. A set of four lifting loops will be supplied with the initial delivery. Four-way chain slings will be required to connect the lifting loops to the crane, to enable un-loading.

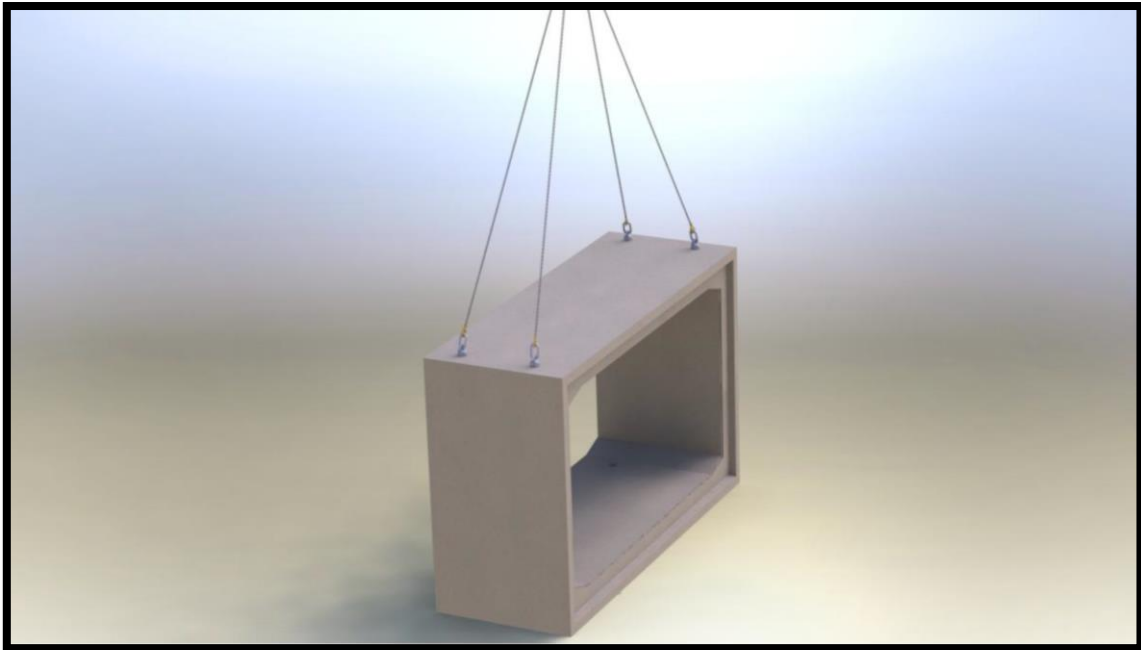


Fig 1 – Sockets in the top slab to be used for laying standard Box Culverts

When offloading, lower the box culverts carefully on to a firm level base away from the edge of the trench they are to be laid. Always move the box culverts by lifting, never drag the units and protect open lifting sockets where necessary, particularly in cold weather to prevent freezing and bursting.

Remember to:

- Ensure current test certificates are available for all lifting attachments.
- Use all lifting points provided in their intended manner.
- Ensure all threaded connections are fully screwed home.
- Ensure lifting chains and slings are of equal length and are not twisted.
- Ensure included angle between the chains at the crane hook is never greater than 60degrees.
- Ensure complete safety of all operatives and the surrounding workforce

Bedding

Before laying bedding, ensure the trench that is to receive the box culverts follows the specified line and gradient. The trench should be excavated to a width equal to the box culvert width plus typically 600mm for most conditions. Maintain a dry formation where possible by diverting water courses, pumping water from the trench or other means.

It is generally recommended that the culverts should be laid on a 200mm thick granular bedding as specified in Specification for Highway Works (MCHW1) or Civil Engineering Specification for the Water Industry (CESWI). In adverse ground conditions it may be necessary to use a concrete bed with a granular overlay (culverts should not be laid on bare concrete). Ultimately, the bedding should ensure that any irregularities are levelled out to create a uniform support for the box culverts to be laid on. If surrounding soil is likely to be relocated into the backfill, then the bedding should be wrapped in a geosynthetic material.

Jointing

Priming and application of the jointing strip must be carried out in accordance with the instructions on the Jointing strip Rubber Bitumen Sealant data sheet provided. The cartons should be stored in a warm environment prior to use particularly in colder periods, so the material is pliable when applying. They should be stored flat and stacked to a limited height to prevent damage.

Laying

Position the first unit at the downstream end of the run, with the socket facing the direction of construction to receive the spigot of the second unit with the socket primed and the jointing strip applied. Lift the second unit and guide it as closely as possible to the first unit, taking care to exclude any bedding material. One way of achieving this is to lay a strip of hardboard or similar thin laminate board under the socket of the first unit wide enough to accommodate the spigot end of the second unit.

Fix the appropriate jointing tackle (either an excavator or typically a hydraulic culvert puller, which can be sourced from machinery hire shops) and just taking the weight of the second unit, carefully draw its spigot into the socket of the first unit ensuring uniform alignment. The jointing strip should be compressed by not less than 30% to effect a satisfactory seal. This is achieved when the longitudinal gap between the joint faces does not exceed 10mm. The jointing force should remain for an additional 15 to 20 seconds after the required joint gap is achieved (typically 5mm) to allow for even distribution. Always ensure the culvert are joint squarely by steering the puller but under no circumstance let one side join first and then try to join the other, as this could result in bursting the socket or misplacing the sealant.

Repeat the operation for subsequent units, but do not relocate the jointing tackle dead anchor until the length of chain or cable has been fully utilized. Always try to keep two units between the dead and live anchors so that pressure is maintained on intermediate joints.

Backfilling

Backfilling should commence as soon as possible after the box culverts have been laid. Selected backfill material (typically similar to surrounding soil, free from large lumps, roots, rubbish or building rubble) should be well compacted in layers of maximum 200mm, working evenly on each side of the box culverts. Heavy vibratory equipment should be forbidden due to possible unsettlement as bedding and backfill are likely to sink under the weight and movement of the box culverts whilst jointing.

Heavy rollers or construction plant are only permitted over the box culverts when the backfill has reached a sufficient height to certify a suitable load distribution and therefore providing protection to the culverts.

Care must be taken since site traffic and construction equipment over shallow fill depths can impose loadings greater than those for which the finished box culvert has been designed. In such cases protective measures will be required.