

Box Culverts

installation guide

Whilst the methods and procedures for the installation of precast concrete box culverts may be familiar to contractors, careful attention to detail will lead to safer working, a smoother flow of operations and a higher standard of finished culvert installation.

This guide provides an overview for anyone engaged in the installation of box culverts and is published to encourage good practice in the installation of precast box culverts.

Taking Delivery

1. The contractor is responsible for offloading box culverts and should:
 - Agree the delivery date and laying sequence, ideally 5 working days in advance of the proposed installation date
 - Provide a suitable access and vehicle hard standing which can be used safely by standard delivery vehicles
 - Provide a suitable crane and plant of adequate capacity to safely off load and install the culvert units
 - Upon arrival on-site, the contractor must take responsibility for the safety of the driver whilst the products are offloaded
 - The load recipient should be aware that to be on the back of a lorry during the offloading process constitutes “working at height” and as such, the requirements of the current Working at Height Regulations (2005) must be satisfied. It is the contractor's responsibility to carry out a risk assessment of the operation and to provide all suitable measures to access the vehicle trailer safely with fall protection provisions provided, as deemed necessary
2. Lifting methods may occasionally differ, but generally all FP McCann units are lifted using a pin and clutch system, details of which can be forwarded upon request. The contractor should:
 - Confirm details of the lifting method being used
 - Undertake all risk assessments in addition to providing all handling equipment necessary to safely operate the lifting method on site
3. Where other methods, such as lifting forks, beams or slings are to be used, the contractor should:
 - Consult with our technical department to ensure that the proposed method is acceptable
 - Protect the box culvert and particularly the joining surfaces from damage while lifting
 - Ensure complete safety of operatives
4. Generally, box culverts are transported as laid, but for safety reasons of load stability, or economy, the box culverts may be transported on end. The contractor should:
 - Check in which orientation the box culverts will be delivered
 - Where box culverts are delivered on end, establish a safe method of turning the units to the as laid orientation. (Further guidance can be seen on the separate lifting and turning data sheet)
 - Provide any equipment necessary for the operation
5. The box culverts may be offloaded into a storage area or they may be placed in line alongside the trench in which they are to be laid. In either situation:
 - Before offloading, check the box culverts for any damage which may have occurred in transit and report any defects promptly
 - Lower them carefully on to a firm level base away from the edge of the trench



- Box culvert units should be moved by lifting and never by dragging
- In cold weather, protect open lifting sockets from freezing and bursting

Preparing the Trench

1. Bedding is intended to level out any remaining irregularities in the trench bottom and ensure uniform support under the full width and length of the box culvert.
 - Lay well-compacted granular material over the full width of the trench to a minimum depth of 200mm, having first removed any protective layer
 - Blind the surface with fine material to assist levelling
2. Having achieved a flat, well prepared base, it should not be allowed to deteriorate.
 - Lay the bedding only a minimum distance ahead of the laying of box culverts
 - Keep off the prepared base so far as practicable
3. As an alternative to granular bedding, a concrete blinding layer is sometimes preferred to protect the formation or to allow faster laying of box culverts.
 - Lay a thin flat apron of unreinforced lean mix concrete about 75mm thick on a trench bottom which has been well prepared to a uniform firmness

Jointing Material

FP McCann can supply jointing material, if required, and this will usually be delivered on the first load to site. If, however, it is not supplied, the jointing material should be ordered in good time. In either case, the jointing material manufacturers storage instruction and application guides should be followed. Joints may be left open in certain cases but a preformed strip compressed within the joint is commonly used. The strip should be applied to the box culvert just before it is laid in the trench.

- Where necessary, clean and prime the inner and sloping faces both spigot and socket and allow to dry
- Place the strip in the internal corner of the socket or where otherwise directed
- Cut mitred ends and join the strip at corners and do not bend the strip
- Check all the joints in the strip to ensure that the strip is continuous
- Always follow the recommendations of the manufacturer of the jointing material

Laying the Culverts

A box culvert line is usually laid from the downstream end with sockets facing upstream to receive the next box culvert to be laid.

- Inspect the box culvert before laying to ensure that the jointing surfaces are clean and that no damage has occurred in handling and storage on-site
- Lower the box culvert carefully on to the prepared base, aligning the spigot with the socket of the unit already laid



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- Prevent loose surface bedding material from entering the joint space during positioning of the unit by placing a hardboard strip beneath the base joint or by any other means
- If any adjustment to level is necessary, remove the box culvert and adjust the surface level of the bedding
- Do not use local packing to adjust the level

Making the Joint

When a preformed strip is used, joints are closed by pulling against the box culverts previously laid.

- Establish a suitable anchor position which will be dependent on the type of winch device being used
- Ideally, take the weight of the culvert unit to be jointed on the crane to reduce frictional resistance at the base of the box culverts
- Allow for a pulling/compression load of approximately one tonne per metre of strip to compress the jointing material
- Apply heat, as recommended, to soften bitumen based strip when the weather is very cold
- Close the joint to the specified nominal gap.
- On completion, make good any holes used for lifting and laying.

To provide an internal seal or to improve hydraulic flow, joints in box culverts of sufficient size may be pointed internally. This can take the form of an elastomeric or bitumen based material with a suitable primer or bond break material, if required. Not all methods and types of jointing, however, should be expected to be completely watertight.

Backfilling

Backfilling should commence as soon as possible after the box culverts have been laid.

- Fill the trench to the level of the top of the box culvert working evenly on each side
- Use selected backfill material well compacted in layers not exceeding 200mm
- Do not use heavy vibratory equipment
- Continue filling over the box culvert and compact in layers
- Do not run heavy rollers or construction plant over the box culvert without protection

Compliance Testing & Joint Tolerances

- Upon completion and during the Installation process the installation team should be mindful of any specific contract requirements which need to be fulfilled. It is worth noting that this is the responsibility of others and not that of F P McCann

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.

Disclaimer:

This document is produced as a guideline document to assist contractors with the proper handling and installation of box culverts and is not intended to be a substitute for site and product specific handling procedures lifting plans, and procedures and relevant safe systems of work. FP McCann bear no responsibility or any liability which may arise as the result of incorrect handling of the box culverts or as a result of any unapproved modification to the units. It is the responsibility of the contractor to ensure correct offloading equipment is available and that correct offloading procedures are adhered too. In addition, it is the responsibility of the contractor to ensure that the installation of box culverts is carried out in accordance with relevant health and safety procedures and in accordance with any specific site conditions. No part of this publication may be reproduced by any means without the permission of FP McCann.



Lifting in the 'as-laid' condition

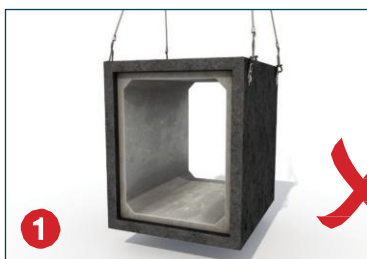
Correct Method

1. Use a two or four leg sling or chain sets with hooks and safety catches to correspond with the number of available lifting points.
2. Only lift from the top face in the 'as laid' condition.



Incorrect Method

1. NEVER lift from the sides in the 'as laid' condition.
2. UNDER NO CIRCUMSTANCES should a unit be lifted on one side only.



Lifting in the 'as-cast' condition

Correct Method

1. Use a four leg sling with hooks and safety catches.
2. Use the lowest lifting points available when lifting in the 'as cast' condition.
3. Protect top edges.



Incorrect Method

1. NEVER lift using top lifting points in the 'as-cast' condition.



Turning from the 'as-cast' condition to the 'as-laid' condition

Correct Method

1. Use a four or two leg sling with hooks and safety catches to correspond with the number of available lifting points.
2. Stand well clear.
3. Provide soft landing material.
4. Cradle bottom edges.



Incorrect Method

1. NEVER turn with lifting points remaining on the side.
2. NEVER turn without soft landing material.

