



# precast concrete box culverts proven strength & performance



Ideal for a wide variety of civil engineering and construction applications



# precast concrete box culverts

PROVEN SOLUTIONS FOR CIVIL ENGINEERING AND CONSTRUCTION APPLICATIONS



## applications

- CULVERTING WATERCOURSES
- ATTENUATION TANKS
- ROAD CROSSINGS
- MULTI-CELL CONSTRUCTION
- PIPE REPLACEMENT
- PEDESTRIAN AND VEHICLE SUBWAYS
- SEA OUTFALLS
- ESCAPE TUNNELS
- SHAFTS
- SERVICE TUNNELS
- PUMPING STATIONS
- CHANNELS
- PORTALS

### Precast concrete box culverts provide the ideal solution to a wide range of civil engineering and construction applications.

The traditional use is for diverting watercourses, but the versatility of these structures sees them increasingly used for attenuation tanks, pedestrian subways, access shafts, service tunnels, sea outfalls, road crossings and a variety of other applications where strength, durability and economy are of paramount importance.

Members of the Box Culvert Association – comprising all the leading manufacturers of box culverts in the UK – offer the capability to design and manufacture structures to meet specific application requirements and loading conditions.

The Box Culvert Association produces a standard specification which covers materials, manufacture, tolerances, external loading, design and detailing standards. The specification also provides a check list of information required from the specifier and provides for the issue of a compliance certificate.

Box culverts which are to carry highway or railway loading are designed to current standards and specification as stipulated by the client.

#### BENEFITS

- Proven strength and performance characteristics means long service life.
- Unlike structures manufactured from alternative materials, such as steel,

precast concrete culverts do not require additional treatments to prolong service life or improve performance. They do not rust and the smooth internal finish of the concrete ensures optimum flow of water.

- Precast culverts meet the current design-life requirements for buried structures. This ability to provide prolonged service life with minimum maintenance makes box culverts the most economic means of diverting watercourses and providing underground access and service shafts.
- Speed of construction and accuracy of profile.

**BOX CULVERT ASSOCIATION**





# Box culvert applications

MANUFACTURED IN A WIDE RANGE OF STANDARD & BESPOKE SIZES, BOX CULVERTS OFFER EXCEPTIONAL VERSATILITY.



Box culverts are available in a wide range of internal sizes with spans ranging from 1000 to 7000mm and heights from 600 to 3000mm.

Not every association member offers the complete range and some also offer non-standard sizes and bespoke culverts.

## ■ CULVERTING OF WATERCOURSES

This is a tried and tested method of enabling development of land which is crossed by watercourses. It offers economy combined with the best flow capacity, even when the gradient is low and headroom and/or width is restricted. Lengths in excess of 1000 metres have been culverted and where necessary splayed units can allow for changes in direction. Openings for access and pipe entry can be incorporated during manufacture.



## ■ PEDESTRIAN AND VEHICLE SUBWAYS

Sections can be provided with suitable headroom for use as pedestrian subways and underpasses. Larger sections can also provide access for cars and light commercial vehicles. Provision can be made for lighting, incorporation of special finishes, post tensioning etc.



## ■ ATTENUATION TANKS

Single or multiple runs of box culverts provide the most economic in-line or offline storage of storm water. In this instance culverts can be supplied complete with end walls, access and pipe entry openings and are designed to carry the loadings from highways, car parks or any other surcharge determined by the location.

## ■ ROAD CROSSINGS

Box culverts offer a cost effective solution and a rapid means of construction thus minimising closure periods and disruption.

## ■ MULTI-CELL CONSTRUCTION

Rectangular box sections laid side by side, with a nominal gap to allow for relative settlement, provide the largest flow capacity in the minimum space.

## ■ PIPE REPLACEMENTS

Box culverts can be designed for as little as 200mm cover and, where necessary, for no side pressure relief from the ground. As such they are a perfect replacement for standard pipes maximising the available flow area.

## ■ SEA OUTFALLS

Specially designed box culverts with increased cover to reinforcement and effective crack control provide the durability to resist the most extreme conditions and are, therefore, ideal for this type of application.

## ■ ESCAPE TUNNELS

Ideal solution for rapid and safe underground escape from industrial and commercial premises, car parks, shopping centres and sports arenas.

## ■ SHAFTS

Vertical access shafts can be constructed using box culvert sections to provide access to deep utilities.



## ■ SERVICE TUNNELS

Box culverts provide an ideal solution for accommodating and maintaining underground services.

## ■ PUMPING STATIONS

Used vertically box culverts can provide an easily constructed solution for the housing and servicing of ancillary valves and pipework.

## ■ CHANNELS

Provided with or without removable lids enabling a wide range of applications from open water course diversion, to service ducts for pipes and cables.

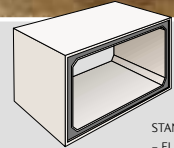
## ■ PORTALS

A further variation of the box culvert for uses including carrying existing water courses and pipes etc in hard or rocky ground.

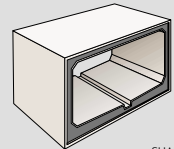


## BOX CULVERTS

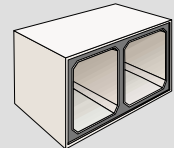
# technical overview



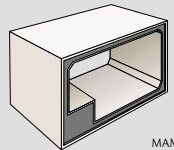
STANDARD  
- FLAT INVERT



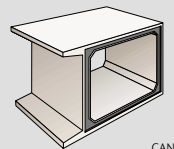
SHAPED INVERT



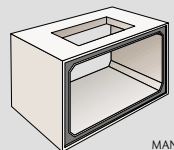
MULTI CELL



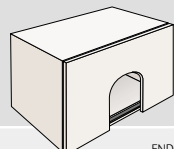
MAMMAL LEDGE  
- SOLID



CANTILEVER SLAB



MAN-HOLE



END WALL UNIT

### ■ CORNER SPLAYS

All sections incorporate internal chamfered corners. To determine flow areas and discharge rates, enquiries should be made to individual manufacturers.

### ■ JOINTING

Box culvert joints are rebated and in some instances may be left open. However, a preformed strip compressed within the joint is usually used. (See separate guide to site practice and associated CD-Rom for further details of jointing and materials used).

### ■ FLOW CAPACITY

The flow capacity of a box culvert is determined by a number of different factors including gradient, roughness coefficient and the geometry of inlet and outlet. The tailwater level can also affect the mode of flow and may prevent the box culvert from running full or under uniform flow conditions and, as a result, the flow capacity will be lower than the full discharge rate.

### ■ CHOICE OF SECTION

Selection is based on finding the flow capacity that meets the design rate of flow or a required storage volume. Varying proportions of width to height are available to meet restrictions on width, depth or headroom.



### ■ TRENCH PREPARATION

Trenches are excavated along the specified line and gradient of the box culvert + 300mm each side for most conditions. The formation should be carefully trimmed to the required depth and gradient, making allowance for the thickness of the bedding. The shape and width of the excavation should always comply with the appropriate Health and Safety requirements and clients specification.

### ■ BEDDING

Full load bearing capacity of an installed box culvert is achieved with uniform support at the base. The bedding layer – either a well compacted selected granular material or a concrete blinding layer – ensures uniform support. Special measures for the box culvert will be required in poor ground conditions.

### ■ LAYING THE CULVERTS

Box culverts are usually laid from the downstream end with sockets facing upstream to receive the next culvert in line. Where preformed jointing strips are used, the joints are closed by pulling against the box culverts previously laid. Where box culverts are of sufficient size for access, a caulking groove can be provided for the installation of a secondary sealant if required.

Full installation advice is contained in the Box Culvert Association's Guide to Site Practice.



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BOX CULVERT ASSOCIATION**

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