THINKING PRECAST?
THINK FP MCCANN

mpa British Precast Drainage Association

BOX CULVERTS & PORTAL FRAMES

DRAINAGE & WATER MANAGEMENT

v2.4



FPMCCANN.CO.UK



FP McCann is the UK's market leader in the manufacture, supply and delivery of precast concrete solutions. Our comprehensive precast concrete business extends to include:

AGRICULTURE I ARCHITECTURAL PRECAST I BOX CULVERTS I BUILDING PRODUCTS DOCK LEVELLER PITS I DRAINAGE I FENCING I FILTER BED SYSTEMS I FLOORING POWER & INFRASTRUCTURE I RAIL I SPECIALIST PRECAST I STRUCTURAL PRECAST TANKS & CHAMBERS I TUNNELS & SHAFTS I WALLING

Modern manufacturing plants at Alnwick (Northumberland), Armagh (Northern Ireland), Byley (Cheshire), Cadeby (Warwickshire), Ellistown (Leicestershire), Grantham (Lincolnshire), Lisnaskea (Northern Ireland), Littleport (Cambridgeshire), Lydney (Gloucestershire), Magherafelt (Northern Ireland), Uddingston (Lanarkshire) and Weston Underwood (Derbyshire) incorporate the latest computerised batching, distribution, casting, curing and handling systems and are operated by skilled and experienced workforces to ensure consistency of quality. Their geographical spread gives us an unrivalled ability to serve the construction industry throughout the UK and Ireland.

By applying the DFMA principles, FP McCann's design engineers are able to evaluate individual precast concrete products part by part, in addition to documenting the assembly process step by step. This allows them to generate the cost, part count and assembly time to provide a benchmark to measure its success and identify the parts and process improvement opportunities. In turn, this has allowed FP McCann to design and manufacture more cost-effective and efficient high-quality precast concrete products with less wastage and greater on-site recycling. As a result, increased productivity, combined with a reduction in production time and costs, allows FP McCann to be more competitive within the marketplace.

Please note: all information is correct at time of going to print.



ADDITIONAL FEATURES

These are varied and can be added to any culvert, as per requirement. For example, end walls, access points, vent holes, inlets, outlets, angles and splayed ends. Starter bars and sockets can be added to facilitate any additional casting on-site, which may be required as part of the finished work.

BOX CULVERT APPLICATIONS

- Attenuation and storage tanks
- Water course diversion
- Open channels
- Road crossings
- Pedestrian and vehicle subways
- Shafts
- Service tunnels and ducts
- Conveyor protection

Designed and manufactured in accordance with all current design specifications and relevant standards, FP McCann's box culverts are available in span sizes from 1000mm to 6000mm and internal heights from 500mm to 3600mm.

With our extensive range of moulds, we also strive to accommodate non standard variances, along with any other internal features requested by the client.

Based in a modern production facility at Byley, Cheshire, FP McCann's experienced engineers and detailing team have the flexibility to quickly respond to meet any design criteria and deliver nationally to just-in-time requirements.

Supplied in either single or multiple runs, the use of precast concrete box sections in civil engineering projects is wide-ranging, from their use for directing/diverting watercourses to the provision of attenuation tanks and underpasses.

FP McCann is a member of the British Precast Drainage Association (BPDA) and their products comply with all relevant standards, as set out in accordance with ISO 9001 and ISO 14001.

bsi. ISO 9001 Quality Management

bsi. OHSAS 18001 Occupational Health and Safety Management

BOX CULVERTS

TYPICAL CULVERT

Units are available in internal span sizes from 1000mm to 6000mm and internal heights from 500mm to 3600mm, with unit lengths to a maximum of 2000mm, dependent on final mould configuration (please refer to internal dimensions chart opposite).



DRY WEATHER FLOW CHANNELS

Half round (or equivalent) channels can be cast into the floor of the units at any position, we offer a choice of equivalent half round diameters.



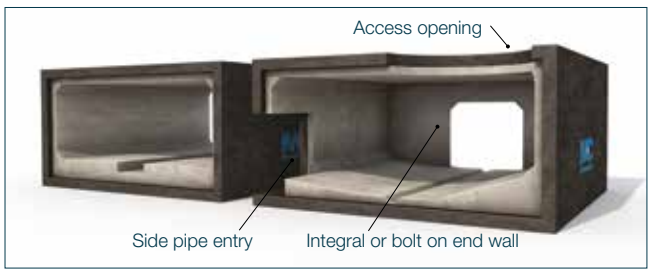
BENCHING

Combined with either a channel or cast as a “vee”, benching improves self-cleansing flow rates.



MAMMAL LEDGES

Cast-in mammal ledges allow access through the culvert to wildlife without the requirement for extra site provisions.



SPECIALS

Bespoke units accommodating a variety of features can be manufactured to our customers’ design requirements.

The proven strength and performance characteristics of precast concrete box culverts, together with their excellent service life, make them ideal for a wide variety of civil engineering and construction applications. Box culvert sections can be manufactured in a variety of internal profiles and sizes, offering exceptional versatility in the uses to which they can be applied.

In addition to the more common use for diverting water courses, box culverts have been used in an array of applications including balancing tanks, pedestrian subways, access shafts, service tunnels, sea outfalls, road crossings and many other situations where the whole life costing consideration requires strength, durability and economy to be of paramount importance.

Unlike other materials such as steel, precast concrete box culverts do not require additional treatments to prolong their life or improve performance. The concrete surface will not rust and the smooth internal finish of the box culvert ensures optimum flow of water through the concrete structure.

Precast concrete box culverts fulfil the current design life requirements for buried structures. With minimum maintenance and the ability to provide many years of service, precast concrete box culverts are the most cost-effective means of diverting water courses, especially with the ever present risk of corrosive elements in the water or soil.

Whilst the methods and procedures for the installation of precast concrete box culverts are familiar to contractors, careful attention to detail will lead to safer working, a smoother flow of operations and a higher standard of finished culvert. Box Culvert installation and jointing details can be downloaded from www.fpmccann.co.uk/box-culverts

This guide provides a reliable checklist for anyone engaged in the installation of box culverts. It is published to encourage good practice in the use of precast box culverts.



BOX CULVERTS



INTERNAL DIMENSIONS

(Based on flat invert culvert units)
Key: Flow area m² / Discharge rate m³/sec

Internal height mm	Width mm (internal span)															
	1000	1200	1500	1800	2100	2400	2700	3000	3300	3600	3900	4200	4500	4800	5100	5400
500	0.46 0.40	0.56 0.51	0.71 0.67	0.86 0.84	1.01 1.00	-	-	-	-	-	-	-	-	-	-	-
600	0.56 0.53	0.68 0.67	0.86 0.89	1.04 1.11	1.22 1.33	-	-	-	-	-	-	-	-	-	-	-
650	0.61 0.60	0.74 0.76	0.93 1.00	1.13 1.25	1.32 1.50	1.52 1.75	1.71 2.00	-	-	-	-	-	-	-	-	-
800	0.76 0.81	0.92 1.03	1.13 1.33	1.37 1.67	1.61 2.01	1.85 2.36	2.09 2.71	2.33 3.06	2.57 3.42	2.81 3.77	3.05 4.12	-	-	-	-	-
1000	0.96 1.10	1.16 1.40	1.43 1.84	1.73 2.32	2.03 2.80	2.33 3.29	2.63 3.79	2.93 4.29	3.23 4.79	3.53 5.30	3.83 5.80	4.13 6.30	4.43 6.81	4.73 7.32	-	-
1200	-	1.37 1.76	1.73 2.37	2.09 3.00	2.45 3.64	2.81 4.29	3.17 4.95	3.53 5.61	3.89 6.28	4.25 6.95	4.61 7.62	4.97 8.29	5.33 8.97	5.69 9.64	6.05 10.32	6.41 11.00
1500	-	-	2.18 3.21	2.63 4.09	3.08 4.98	3.53 5.89	3.98 6.81	4.43 7.74	4.88 8.68	5.33 9.62	5.78 10.57	6.23 11.52	6.68 12.48	7.13 13.44	7.58 14.40	8.03 15.37
1800	-	-	-	3.17 5.21	3.71 6.38	4.25 7.57	4.79 8.78	5.33 10.00	5.87 11.24	6.41 12.48	6.95 13.74	7.49 15.00	8.03 16.27	8.57 17.54	9.11 18.82	9.65 20.10
2100	-	-	-	-	4.34 7.83	4.97 9.31	5.60 10.83	6.23 12.36	6.86 13.92	7.49 15.49	8.12 17.07	8.75 18.67	9.38 20.27	10.01 21.89	10.64 23.50	11.27 25.13
2400	-	-	-	-	-	5.69 11.11	6.41 12.94	7.13 14.81	7.85 16.70	8.57 18.62	9.29 20.55	10.01 22.50	10.73 24.46	11.45 26.44	12.17 28.42	12.89 30.41
2700	-	-	-	-	-	-	7.22 15.11	8.03 17.32	8.84 19.57	9.65 21.84	10.46 24.14	11.27 26.46	12.08 28.80	12.89 31.16	13.70 33.53	14.51 35.91
3000	-	-	-	-	-	-	-	8.93 19.89	9.83 22.50	10.73 25.15	11.63 27.83	12.53 30.54	13.43 33.27	14.33 36.03	15.23 38.80	16.13 41.59
3300	-	-	-	-	-	-	-	-	10.82 25.49	11.81 28.52	12.80 31.60	13.79 34.71	14.78 37.86	15.77 41.03	16.76 44.22	17.75 47.43
3600	-	-	-	-	-	-	-	-	-	12.89 31.96	13.97 35.44	15.05 38.97	16.13 42.53	17.21 46.13	18.29 49.76	19.37 53.42

Please note: These figures are a guide only and will be dependent on the mould configuration used in manufacture. Discharge rates are calculated using Colebrooke-White equation for a fully wetted perimeter under uniform flow conditions and assuming a flat invert culvert unit. The assumed laying gradient (s) is 1:1000 with a roughness co-efficient (k) of 0.3. Where different values maybe required, please contact the office number below to discuss your specific requirements. The hydraulic design of a box culvert should always be undertaken by the overall scheme designer, as they are able to take into account the upstream and downstream conditions and other parameters such as freeboard, restriction due to silt build-up and need for the culvert to be free flowing at all times. Due to the lack of this information, FP McCann will only give discharge rates for an idealised culvert, which may not suit the local conditions.

PORTAL FRAMES



Portal frames either consist up of an n-shaped upper unit and two L-shaped footings per ring, or simply just an n-section. The portal frame system offers a quicker and more economical alternative to bridge beams and abutments that are cast in-situ. Units can be designed for specified loadings, and fulfill Eurocode requirements.

KEY FEATURES

- Alternative to bridge beam construction
- Ball and socket joint between wall and roof
- Designed per project requirements
- Reduced insitu works
- Used for road infrastructure
- Bitumen coating can be factory applied if required



UAN CULVERTS

UAN culverts consist of two U-shaped sections, which can then be assembled on-site. A ball and socket joint is used between the two parts of the finished section. This option can be offered for larger box culverts that are unsuitable for transport as a monolithic structure or if there are any site specific weight constraints.

The popularity of UAN culverts is growing, largely due to their immediate stability, quick installation, and the flexibility in being able to manufacture culverts for a wider range of applications. Key uses include as an underbridge for road or rail, and in other road infrastructure projects.

KEY FEATURES

- Adjustable moulds mean the product can be made to accommodate a range of projects
- Instant stability
- Mammal ledges can be added to allow wildlife to safely pass through the culvert
- The ball and socket joint is typically located mid-height.
- Used for road infrastructure
- Bitumen coating can be factory applied if required





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