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EXCLUSIVE ARTICLE FOR DRAIN TRADER 20TH ANNIVERSARY ISSUE (APRIL)

THE BENEFITS OF PLASTIC MANHOLES AND THEIR INCLUSION IN SFA8

Plastic manholes have become an essential part of the UK sewerage system landscape, due to their many performance qualities and ease of use. They are a modern yet well-established installation, providing a practical and regularly used solution. By being built off-site and delivered complete, they save project time and represent an excellent example of lean construction techniques in action, reducing waste, effort and cost.

During this 20th anniversary issue of Drain Trader, it is appropriate timing that these high quality plastic manholes have been recognised and included in the latest draft of Sewers for Adoption guidance (SFA8).

BPF Pipes Group members share some of their recent case studies demonstrating the successful application of polyethylene (PE) manholes.

The benefits of off-site builds

At a former brownfield site in Norfolk, 67 high-quality homes were created by housebuilder Lovell. Although the site was originally planned to have a traditionally built concrete attenuation system, the project civil engineers switched to a polyethylene system based on their successful experience of using plastic manholes on other sites, the quality of the product, advantages of speed of production, delivery, and ease of use on site.

Lovell Regional Operations Director Trevor Haystead confirmed: “We are committed to sourcing the best and most efficient products and procedures for all our projects. Taking the decision to use plastic products in place of concrete enabled work at the Firs Park development to take place more efficiently than was initially anticipated. We are pleased with the outcomes and have resolved to use plastic in future projects.”

A total of 12 manholes were provided, with 185 metres of 1050mm and 900mm diameter pipework.

These manholes are a great example of agile project management, being constructed off-site, tailored to exact project needs and delivered quickly, ready to be installed and connected. They help reduce traditional construction site issues of time, cost and health and safety, requiring less heavy lifting equipment, and represent the welcome evolution of the construction industry.

Plastics proven for complex civils projects

The soft ground at a major housing development in King's Lynn represented a challenge for the ground-working team, as the risk of settlement can occur during or after the construction phase due to the compressibility of this kind of soil.

When ground conditions are soft and malleable, heavy concrete chambers used for ongoing access to pipework are likely to sink, and excessive settlement of chambers puts everything built above at risk. While piling is a common solution, increasing and strengthening the load capacity of a traditional foundation build, it requires deep drilling and additional supports, adding labour, time and material costs.

However, the flexibility of polyethylene allows products to move with the ground, obviating the need for piling for the water management system and the drainage infrastructure. This saved considerable time, and the manholes were constructed off-site and delivered ready for installation. It proved an easier and safer solution for the installation team, as piling was no longer required.

A total of 70 bespoke manholes ranging from 1200mm to 1300mm in diameter were provided across the stormwater, foul and culvert network – a truly large-scale development – along with 840 metres of plastic pipes fabricated off-site and delivered in sizes ranging from 400mm up to 900mm diameter.

Satisfying traffic loading requirements

In Hull, a new development providing 142 homes as part of the city's ongoing regeneration saw large diameter plastic piping and modular manholes (constructed off-site) used to provide a number of benefits over a traditional concrete system.

The design included 12 pre-fabricated manholes featuring ready-to-install access points that could be integrated at any part of the network system. The manholes were benched and channelled in accordance with Sewers for Adoption guidelines.

Pipes and manholes were used to form four tanks to attenuate and convey surface water run-off from the development. Each tank was linked to a flow control chamber, featuring a flow control unit and penstock, to manage the release of surface water run-off into the approved watercourse. A pre-installed weir wall in each of the chambers provided a stable end connection to Yorkshire Water's existing drainage system.

This was a value engineered solution, with pipes manufactured to the perfect stiffness classification to meet the site's needs, together with convenient pre-fabricated pipework and manholes. The solution met the requirements of Yorkshire Water and Hull County Council, while also providing a robust and efficient system ideally suited to the development's challenging conditions.

These large diameter pipes not only conformed to Sewers for Adoption guidelines, they also managed the traffic loading from the road infrastructure. The conveyance and attenuation needs of the large site were met to the satisfaction of Yorkshire Water as well as other parties, and the engineered system design gained full Section 104 Approval for the adoption of surface water run-off into their watercourse, and Section 38 Approval for the installation of the system on the development site.

Plastic ideal for loading at Hull's renewable energy site

Over 2 kms of large diameter PE pipe (from 400mm to 750mm) along with 50 custom-built manhole chambers, benching, ladders, stubs and lifting eyes, were specified at the world-leading Green Port Hull site, which is home to a wind turbine manufacturing facility and other world class renewable industries.

A key issue for the site, along with the requirement for excellent drainage to withstand storm events and high levels of water running off factory buildings during rainfall, was a solution to

withstand the abnormally high loading conditions caused by the giant wind turbines that were being installed adjacent to the pipelines. PE pipes were chosen due to the unusual and unsound environment requiring a product flexible enough to allow for land movement, but strong enough to not buckle or crack. The manholes were pre-assembled off-site, saving valuable time on the ground.

Beating the 1 in 100-year storm event

Other stormwater solutions using plastic manholes and pipes have been installed at sites including Houghton Regis in Bedfordshire, where the solution was designed to cater for '1 in 30-year' as well as '1 in 100-year plus 30 per cent climate change' storm events.

The bespoke stormwater solution incorporated staggered legs to take site conditions into account, and it also met site requirements and adopted elements laid out under Section 104 for approving water company, Anglian Water.

The attenuation tank supplied for the project featured a 3m diameter offset vortex flow control chamber to control discharge water from the tank at an agreed rate of 10l/s, so the local watercourse was not overwhelmed. To control additional flow when required, the chamber also featured a penstock flow control.

Over 500m of pipe runs in 2100mm diameters were supplied. The technical team design engineered the pipe to ring stiffness SN2 to meet ground conditions, burial depths, native soil pressures and loading on-site. The system was tested to pass required deformation and buckling checks in accordance with BS EN 1295-1.

To accompany the pipe runs, the bespoke system incorporated 34 pre-fabricated modularised fittings which included 90° bends and 'F', 'T' and double 'T' fittings to fit the limited on-site dimensions perfectly.

The socket and spigot nature of these engineered fittings kept jointing to a minimum, allowing for easy pipe alignment and speedy installation using electrofusion jointing. This in turn significantly reduced on-site installation time and cost.

A total of 10 access manholes were also supplied in 1200mm and 1800mm diameters, to make maintenance work safer and less strenuous for installers needing pipeline access.

Helping the construction industry evolve

All of these examples demonstrate pioneering ways in which plastic manholes and associated pipes are helping to transform standard site procedures in the construction industry, safely and effectively. Their growing use across the UK reflects the increasing awareness that plastic is often the best product for the application.

Today, more than ever, developers, local authorities and house-builders are seeking high quality, sustainable products and long-term solutions with low environmental impact, responsibly sourced and safe and easy to handle on site. Plastic manholes from BPF Pipes Group manufacturers offer an effective and efficient solution.

The BPF Pipes Group and its members have welcomed the inclusion of plastic manholes in the new draft SFA8, which reflects their growing acceptance by the UK water industry as a good quality solution for the modern sewerage network.

Guidelines and a list of members are provided at www.bfppipesgroup.com

ENDS

PHOTO-CAPTION: Plastic manholes are well proven and popular in use in the UK, and now come with SFA8 endorsement

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About the BPF Pipes Group

Part of the British Plastics Federation, the BPF Pipes Group is a trade association representing manufacturers and material suppliers of plastic piping systems across the UK. Committed to sustainable construction, its aims are to provide a forum for the exchange of technical expertise between member companies and to promote the importance of plastic as a pipework material, for the full spectrum of above and below ground, pressure and non-pressure applications. It also plays a key role in initiating and disseminating research and informing and influencing the standards bodies pertaining to plastic pipe systems. It works closely with the BPF and TEPPFA, the European Plastic Pipes and Fittings Association.