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**Lanes
Group plc** Best Practice Series

**Drainage Installation:
Getting it right first time**

Drainage installation: introduction

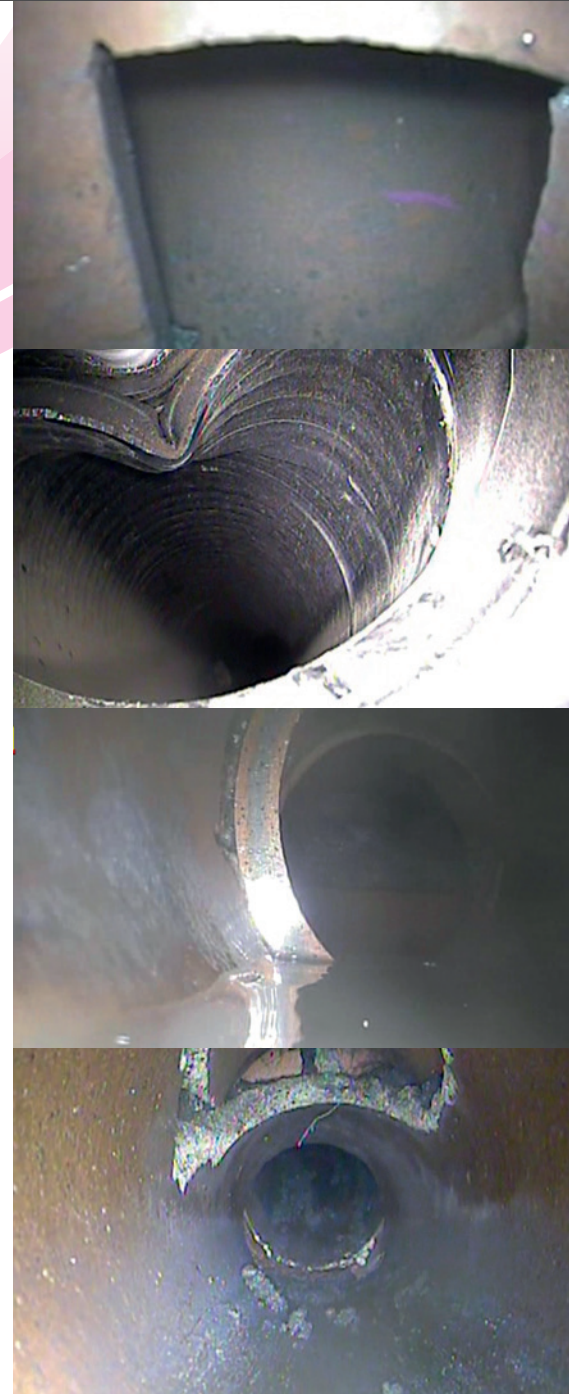
If there's one area of a new build project where the expression 'once it's in, there is no going back' applies, it's the drainage system.

Drainage is one of the first things to be done in a build, and much of the subsequent construction sits on top of it, whether that's the building itself or the hard landscaping. Make a mistake with the drainage system and it may only become apparent once the building is complete. By then, although it's not technically too late, it can be a long drawn out, disruptive and expensive process to put right.

That's why every effort should be made to get things right first time. But, because drainage systems are out of sight and therefore all too often out of mind, some builders see it as an area of the project where corners can be cut.

It's a temptation that many have found too great to resist, but the results can be hugely expensive to put right. They can also result in substandard drainage performance, meaning annoyance, if not misery, for the property owners — perhaps for years to come.

Here is our guide to what you should and shouldn't do when installing drainage systems.



DON'Ts: common installation blunders

So, what are the most common mistakes (or examples of negligence), and how can they be avoided?

1: Incorrect sizing of pipework

The architect, civil engineer and surveyor on any project should establish the correct type and diameter of pipework to install. Yet, for whatever reason, drainage surveys regularly show this does not necessarily lead to the right sized pipes going into the ground.

If the pipes do not have the hydraulic capacity for the demands placed on them during periods of peak flows, problems occur. Blockages can increase, pipes can surcharge, backing up into manholes, toilets and sinks, and they will also be at greater risk of structural failure.

2: Incorrect pipe gradient

Drainage systems should be self-cleansing – the force of the water through the system from gravity should be strong enough to carry waste out into main sewers. For this to happen however, the pipes have to be installed at the right gradient. If they are too shallow, or the necessary pumping system isn't installed to reduce build costs, there will be a higher risk of blockages.

3: Incorrect backfill

Trenches into which drains are installed are backfilled with material called ballast. If the wrong type is used, or isn't properly distributed or compacted, pipes may settle over time, causing 'flat spots' which hamper the self-cleansing process, resulting in a build-up of debris and blockages. Usually the only solution is excavating and re-bedding the pipe but this is costly, particularly if something has been built over the top of it.



4: Cross-connection

This happens when surface water and foul water drains are wrongly connected together. If foul wastewater is going to the surface or storm water system, it means that waste (sewage) is being discharged into open watercourses, potentially causing serious pollution.

This is surprisingly common, even with relatively large housing developments, and may result in prosecution by the Environment Agency, with the associated the expense of fines, court costs and remedial action.

If the error involves surface water to foul system misconnection and it has not been included in the engineer's hydraulic calculations, the system may become overloaded, resulting in blockages, surcharging and floods.

It's worth noting that many misconnections are due to home owners themselves installing additional equipment post-build, such as washers, additional toilets, etc., either without checking the drainage connection or without ensuring that the installer has.

5: Poor drainage design

Drainage systems are under more pressure now than ever before, so designing them to cope with the added demands placed on them is essential. Despite the best efforts of the wastewater industry to educate people, the incidence of wet wipes, sanitary products, FOG (fat, oil and grease) and other items down toilets, sinks and drains is still high, yet systems are often installed with inadequate maintenance access, such as manholes and rodding points.

Different types of pipes have different strengths and weaknesses. For example, plastic pipes need more bedding, and can be less resilient to modern maintenance and cleaning techniques. Clay pipes on the other hand are more susceptible to being invaded by roots. Making the wrong initial choices can lead to problems later.

6: Poor drainage construction

Badly installed drainage will perform badly and this is one of the biggest issues. Examples include:

- Wrongly fitted bends (eg too tight a turn) slowing down water flows
- Manholes with inadequate benching (concrete sloped section going down to the open pipe) creating snagging points for waste material
- Poorly fitted pipes and connectors resulting in more points, as well as open joints that can let roots in more easily.

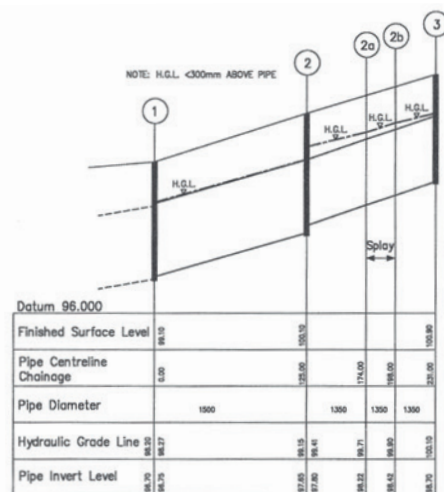
All these issues result in the higher risk of blockages, as well as pipe subsidence and cracking. Badly fitted manholes also allow debris to enter drains, increasing the risk of blockages.

DOs: getting it right

The failings we've mentioned could contribute to potentially serious drainage problems and costs, weeks, months, or even years down the line. So, what can be done to ensure they don't occur in the first place, and to make sure that on-going drainage maintenance is as stress-free as possible?

1: Future-proof your system

Think ahead. Make sure the drainage system has the correct hydraulic capacity to meet future demands, especially if you are planning further building work on the plot.



2: Build in multiple access points

When budgets are tight, not installing a manhole might look like a saving. But, as we have seen, not having adequate access can lead to serious problems later. Spending hundreds now might save thousands later.

Installing rodding eyes at key points could also pay dividends if it means that a drainage engineer is able to clear a blockage in minutes rather than hours or days in the future.



3: Carry out a post-works drainage survey

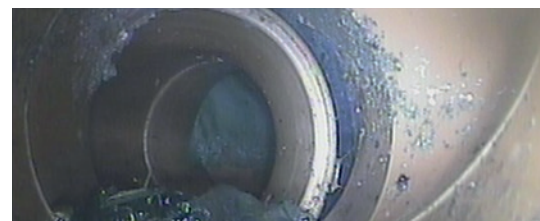
Whether the property owner is installing drainage, or using a groundworks contractor to do the work, a post-works drainage survey is a must. A utility company will not adopt sewers and drains without confirmation that it is fit for purpose. A drainage maintenance specialist will use remote access CCTV cameras to check the drainage system thoroughly.

Commonly surveys show errors such as spikes and stakes which have been mistakenly driven into newly-installed pipes, concrete poured down drains by incompetent groundworks teams, and joints which have worked loose thanks to poor bedding, or because of heavy plant working on the ground above.

A timely CCTV drainage survey with HD-quality video footage will reveal the extent of any problems and their likely cause, whilst work teams are still on site and can be held to account. It is another cost, but one that definitely pays off if it shows that something has gone awry at build stage.

4. What can you do if the new drains aren't fit for purpose?

Once a post installation survey has been carried out, any problems should be dealt with before handover and/or adoption. Make sure you get an expert to carry out the survey and assess the condition of the pipes. If there are issues, don't panic. Specialist reline companies (like Lanes) will fix drains and sewers without resorting to major excavation, wherever possible.



WRC-accredited no dig technology involves installing a CIPP (Cured In Place Pipe Liner). An appropriately-sized liner is fitted inside the existing pipe, then cured (hardened) using either hot water, ambient temperature or UV light. The team will tell you which method should be used based on various data.

Runs of pipe can then be repaired or strengthened using either a series of short patches installed end to end; or by inserting a full length liner running from manhole to manhole. Lining pipes in this way saves having to dig up already landscaped gardens or paved driveways and roads.

Note: some adopting agencies won't accept patch or point repairs, so it is worth checking with yours before you start any remedial work.

5: Prepare drawings of as-built system

Drawings are easily shared with any drainage company in the future, and will help future maintenance issues to be understood quickly, reducing time and costs involved in finding a solution.

Commercial properties in particular benefit from having accurate data available. Building Information Modelling (BIM) legislation has moved the construction sector in this direction.

Legally Speaking

Here is an overview of the main areas of legislation you should know about. Please note that they do not all apply to England, Wales, Scotland and Northern Ireland. There may be regional variations.

The Water Industry Act 1991 says that there is no right to discharge foul water into a surface water sewer where separate sewer systems exist and prohibits connections to storm water overflow sewers. It is an offence to cause a drain or sewer to connect with a public sewer in contravention of section 106. Sewerage companies may disconnect drains and sewers wrongly connected to the public sewer and recover their costs; and they may carry out work on private drainage should they believe it to be objectionable.

Adoption of drainage and legal agreements specifications sections within the Highways Act 1980 and Water Industry Act 1991 allow a drainage system to be adopted by a sewerage undertaker (who then is responsible for future maintenance of the system). The usual course of adoption of drainage for a new development is through either Section 38 agreement (Highways Act 1980) or Section 104 agreement (Water Industry Act 1991) depending on who will adopt the system. As drainage is installed early on in a project, any problems discovered in a post-build survey may be costly to rectify. It is worth noting that no-dig repair solutions may be possible (liners and patch liners), minimising further delays and spiralling costs.



Section H4 of Building Regulations, Approved Document H 2002 (incorporating 2010 amendments) gives guidance about when it is permissible to build over, or within, 3-metres of sewers, and the measures to be employed if this is done. H4 applies to drains, sewers and disposal mains shown on the public sewer records, even if the pipe is not a public sewer. Landowners will need to investigate this before building.

The Building Act 1984 gives a local authority power to deal with the satisfactory provision of drainage for existing buildings. Where private drainage is unsatisfactory, a health hazard or a nuisance, the local authority can serve notice on the owner to make satisfactory provision for the drainage of the building. If they fail to execute the works the local authority has powers to carry out works in default and recover costs.

The Sewerage (Scotland) Act 1968 mirrors the Building Act in England and Wales, and allows Scottish Water to enforce work to rectify outstanding misconnections.

The Water Resources Act 1991 allows the Environment Agency to serve notices requiring anti-pollution works where any noxious, poisonous or polluting matter has entered or is likely to enter controlled waters. It sets out principal offences relating to pollution of watercourses. Foul water misconnections to surface water sewers may result in pollution of controlled waters at the point of discharge, which is a strict liability offence.

The Water Act 2014 makes provision about the water industry; about compensation for modification of licences to abstract water; about main river maps; about records of waterworks for the regulation of the water environment; about the provision of flood insurance for household premises; about internal drainage boards; about Regional Flood and Coastal Committees; and for connected purposes.



Private Sewerage transfer regulations

Who owns what? Responsibility for sewers and drains is shared between property owners, water and sewerage companies, local authorities and the Highways Agency as follows:

- Property owners (householders or landlords) are normally responsible for drains and private sewers which carry household waste up to the point where they connect with the public network. Since Private Sewer Transfer legislation on 1 October 2011, this is usually at the boundary of the property. (See www.ofwat.gov.uk/publications/transfer-of-private-sewers/ for more details.)
- Water and Sewerage companies (WaSCs) are responsible for the public sewers. These are usually in roads or public open spaces, but may run through private gardens. The WaSC has a right of access to these sewers for maintenance but must follow a code of practice if working on your land.
- Local authorities are landlords for council houses and responsible for highways drainage, including gullies, on roads they maintain.
- The Highways Agency is responsible for highways drainage on the trunk roads and motorways they maintain.

Pumping stations and septic tanks

Pumping stations pump your wastewater to the local sewage treatment works. From October 2016, private pumping stations serving more than one property were adopted by WaSCs. This means they are responsible for the stations' running costs and maintenance.

If you are installing a septic tank, you must follow general binding rules. Visit www.gov.uk/permits-you-need-for-septic-tanks for more details.



If in doubt, talk to an expert. If you need to know more about drainage installation best practice, or would like information about surveys and maintenance programmes, call 0800 526 488 and we'll put you in touch with your local Lanes team.



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