

	<b>TRENCHLESS TECHNOLOGIES INFORMATION CENTRE</b>	
	TRENCHLESS TECHNOLOGY GUIDELINES	SECOND EDITION
	PIPE EATING REPLACEMENT AND EXTRACTION	NEW VERSION JUNE 2005

## 1. PIPE-EATING AND REPLACING

Microtunnelling equipment, described in detail elsewhere, can be used for the trenchless replacement of undersized or damaged sewers, as well as for new installation. The 'pipe eating' process, as it is known, is suitable for the replacement of clayware, concrete, asbestos cement, GRP and even reinforced concrete pipes, with the new pipe being jacked in behind the microtunnelling machine.

Microtunnelling machines can excavate an existing pipe, whilst a new pipeline is simultaneously jacked in behind. The machine crushes the existing pipe material with its built-in crusher, and the process also permits realignment and upsizing of the sewer. Systems exist which allow on-line pipe replacement without flow diversion. During installation, the sewage flow is pumped through the shield separately from the pumped spoil slurry circuit, and no over-pumping is required.



A further adaptation uses specially designed teeth within the cone crusher to cut the reinforcement in a concrete pipe, allowing the excavation of all conventional pipe materials in addition to concrete. Some machines have a pilot head fitted to the cutting wheel, which guides the machine within the existing sewer, together with pneumatic hammer action, which assists the cutting head to crush the old pipeline.

## 2. PIPE-REAMING WITH DIRECTIONAL DRILLING MACHINE

This technique allows on-line replacement using a directional drilling machine, described elsewhere, with a pullback capacity of at least 10 tonne. The system employs specialized reaming tools to grind up the old pipe, whilst the new pipe string is drawn in behind. The fragments are suspended in the drilling fluid and pass through the existing pipe to a manhole or recovery pit.

### **3. LEAD PIPE EXTRACTION & REPLACEMENT**

Lead water pipes can represent a significant health risk through the absorption of lead into drinking water. Lead water mains can be lined or replaced by techniques discussed elsewhere in these Guidelines. However, the major problem of lead contamination arises in small-bore service pipes (typically 12 to 25 mm diameter) for which most systems aimed at larger pipes are inappropriate. The lining of lead service pipes with a thin-wall, folded PE liner is covered in Section E.

A method of extraction and replacement has been developed in which the existing lead pipe is pulled out of the ground and replaced by a new PE service. The key element of the technique is a steel cable fitted with cones that expand to grip the internal wall of the lead pipe. A winching force is applied to the cable, and a pushing device is used on the rear of the pipe. As the old pipe is extracted and wound onto a drum, a new PE pipe is pulled in simultaneously by the same cable.

### **4. SUMMARY**

1. Pipe eating like other 'On-line' replacement systems offers a means of replacing or upsizing existing pressure or gravity pipelines economically and with minimal or no excavation.
2. Correctly applied and with the right accessories the technique can replace a variety of existing pipe materials.
3. In all cases, the success of the operation will depend on having accurate information about the original construction materials and the condition of the existing pipeline, including, for example, whether there have been any localised repairs, and whether sections of the pipeline have been surrounded in concrete.
4. Laterals and service pipes must be disconnected prior to the replacement of the main, and then subsequently reconnected to the new pipeline. This is usually carried out from a small excavation. The number and frequency of connections may influence the economic viability of the technique.
5. Techniques have been developed for the extraction and replacement of lead service pipes for potable water.
6. On-line replacement is one of trenchless technology's major growth areas, and it is likely that new developments will continue to extend the capabilities of on-line replacement systems, whilst also adding to their economic benefits.