CAN MODERN SURVEY TECHNIQUES REDUCE EASEMENT LIMITS NEAR BURIED SERVICES?

With demand for new housing and other building activity across the UK continually on the rise, development companies are ever more desperate to re-develop existing, under-utilised or derelict 'Brown Field' sites, particularly within the urban situation. Whilst at first glance this appears to be an excellent use of 'spare' land, it can bring with it a set of problems that may not, at first, be obvious to the untrained eye, that of existing buried services.

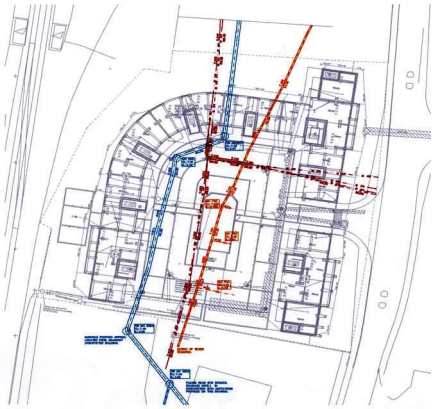
Where land has been in earlier use, there will normally be a range of buried services that will have to be dealt with, in one way or another, before new building work can begin. It should also be noted that it is not only 'Brown Field' sites that may have this 'problem'. In some cases, open land between developed areas, villages etc, which may appear to be 'virgin' land, may well have services buried beneath it.

PLANNING REQUIREMENTS

Currently, it is the responsibility of the developer to ensure that a full and accurate buried services plan of a site is obtained prior to any development work commencing, not the service or utility owner. As has been well documented previously, utility plans are notoriously inaccurate. In many instances, plans show manholes and other surface features reasonably well but, often, these are simply connected with straight lines to indicate the buried service route, which can be significantly off the actual alignment. This can lead to major difficulties for developers.

Shallower services, such as pressure mains for gas and water or cable utilities, are not normally too much of a problem because they can be relatively easily re-routed. This is not the case for sewers, which generally rely on a gradient to ensure gravity does most of the work in transporting flows. Re-routing this sort of service can involve some major reconstruction work.

The Sewers For Adoption – 6th Edition document, for example, has within it a table of minimum required



The sort of circumstance where pre-development design work would have prevented a building project from stopping and costly design work being wasted. Here a building project was forced to stop due to unknown easement problems.

distances (commonly referred to as easements) that should be left when constructing new buildings or structures. This easement is the minimum clear gap that should be left between the proposed structures and any known 'Public or Prospectively Adoptable Sewers'. The table broadly relates service diameter and depth to the minimum distance that should be maintained between it and any new structure.

To a large extent, the distances indicated within the aforementioned

document allow for a significant degree of inaccuracy in the existing service plans and the perceived accuracy of the mapping systems available, remote or otherwise, at the time the document was prepared. With existing plan accuracy being what it is and with many of the available mapping systems claiming at best ±5% to 10% accuracy based upon the depth of the service, it is easily understood why the large easements were chosen. Even then the limits vary between individual Utility owners, providing little by way of consistency.

For example the current limits, for the majority of sewer operators, say that for a sewer of between 150 and 299 mm, with an invert depth of between 3 to 4 m, the minimum distance to the new structure should not be less than 3 m. For larger, say 1,200 mm diameter sewers, with an invert at between 6 and 7.5 m deep, the minimum distance should not be less than 6.5 m. Whilst this might not seem a lot, when considering the nature and size of many brown field sites, this means, in the case of the larger diameter, deeper sewer mentioned, that an easement in excess of 13 m across the sewer centreline must be left and this varies dependent upon the structure size. For many sites this sort of distance can completely wipe out the potential for economic development of an area.

IMPROVING ACCURACY

This raises the question: 'If the accuracy of plans relating to buried services can be significantly improved to within less than 0.25% in both vertical and horizontal position – could there be a case for reviewing these minimum easement distances?'. Modern building and piling techniques mean that structures can be positioned and built so that subsurface loadings can be very accurately determined. Friction resistant piling systems will ensure that loadings, if so designed, can be totally applied below the invert

Left: Launching a PipeTrack unit from an existing manhole.

Prepared for Infotec by: NoDig Media Services. Email: ian@nodigmedia.co.uk

of a structure. With highly accurate buried service plans this could ultimately mean that an existing service could be 'built around' or immediately adjacent to a structure without fear of damage or reduction in its effective service life. Other No-Dig technologies also ensure that on-going maintenance and repair can be achieved without having to resort to major invasive trenching works.

One subsurface and buried service mapping consultant has introduced a revolutionary system that ensures that this sort of accuracy is achievable now. Infotec, based in Leigh-on-Sea, Essex, UK, recently introduced revolutionary mapping technology that offers very accurate capabilities, 'PipeTrack'.

Infotec has spent many years in the buried service mapping and detection business the company has developed a range of experience and specialist surveying services, and has invested heavily in the various aspects and technologies that such a company needs to be successful in this arena.

Downloading survey data from the PipeTrack unit after completion of a pipeline survey.

PIPETRACK TECHNOLOGY

Based on a system originally developed in Belgium for the accurate, 'as-built' mapping of HDD bores, 'PipeTrack' is the latest development in 'in-pipe' mapping technology. The system has the capability to survey pipeline routes and depths to an accuracy of <0.25% in the horizontal plane and <0.1% in the vertical plane from a single pass survey. This accuracy can be improved further by the use of multiple passes over the same survey route. With even greater accuracy achievable in vertical alignment, accurate longitudinal section information can be obtained without the use of costly man-entry survey teams.

'PipeTrack' works by using a data capture probe that is passed through an existing pipeline, of anything between 50 mm to over 2 m diameter, without the need for man-entry operations. This makes for an extremely safe method of operation.

Because the unit is fully self-contained, with an array of survey sensors and data storage facilities on-board the unit, it is also independent of any surface or manual control requirements, eliminating the need for traffic control or night-time working in all but a few cases. It can operate in sewer pipes with live flows (potentially the unit can operate underwater) and flow variations in such circumstances do not effect the 'PipeTrack' performance, a factor that would result in other survey methods being aborted.

The independent nature of 'PipeTrack' also means there are no limits to depth or length of survey, within the on-board data storage capacity of the unit. So, as well as reducing the manning costs for any one survey to a minimum, the system also offers very high productivity with survey speeds of more than 4.0 metres per second being achievable.

'PipeTrack' is also unaffected by the pipeline construction or material, and the technology used is not affected by magnetic fields or other sources of interference that often affect the accuracy of other existing survey techniques. Being able to perform in this way ensures that very accurate surveys can be performed at reduced cost, very efficiently.

'PipeTrack' also provides for the client, as part of its software, a built-in Quality Control reporting system that provides, for each survey, a guarantee of positional accuracy of the pipeline being investigated, yet another unique advantage.

The 'PipeTrack' system can identify hydraulic deficiencies along a pipeline such as humps, bellies, or backfall's. This, in turn, enables engineers to plan for maintenance and/or future capital expenditure with much greater precision.

EASEMENT LIMIT REVIEW

So, with this level of accuracy now available to clients, combined with the potential to use modern building techniques, is it time that buried service owners, regulatory bodies and industry advisors revisited current proximity/build-over or easement requirements?.

Such a review could significantly ease the pressures on re-development sites and those development contractors which are trying to face up to increasing housing and business land shortages, particular where urban brown field sites are concerned. By undertaking such a review, many sites currently considered unsuitable for redevelopment, due to the restrictive easements, could become commercially viable.

To put it another way, and one that may seem more attractive to the service suppliers, by reviewing the current limits, and with the right safeguards in place, the more development land that could be made with the aid of buried service owners, the greater the potential to increase their own paying customer base within their area of operation.