



## Traffic Advisory Leaflet 2/14

November 2014



# Using the Core and Vac technique at road works

This is one in a series of Traffic Advisory Leaflets providing guidance on methods of working and innovative techniques aimed at reducing traffic congestion due to road works. The series is aimed at utility companies, highway authorities, contractors, equipment suppliers and others involved in road (or street) works. Each leaflet in this series is based on research carried out by TRL Limited on behalf of the Department for Transport and Transport for London.

## Introduction

This leaflet gives guidance on the use of Core and Vac (coring and vacuum extraction) for repairing buried apparatus. The technique allows utility companies to open the road, gain access to their apparatus and reinstate the site considerably faster than is normally the case with conventional excavation methods. It can be very cost effective and it minimises damage to the structural integrity of the road. Core and Vac is not covered by the Specification for the Reinstatement of Openings in Highways. The use of technique will therefore require the agreement of the highway authority.

Core and Vac was originally developed for the gas industry in the USA and is becoming increasingly used by gas and water industries in the UK. It is particularly suited to maintenance and repair of buried valves. Core and Vac is used on flexible and rigid construction pavements. Using specialist equipment (see Figure 1), it involves drilling a hole up to 600mm diameter through bound or concrete surface layers, removing the resulting core, then removing any unbound material through vacuum extraction to gain access to the apparatus. Following repairs to the apparatus, the unbound material is returned to the excavation and compacted in layers, although it is sometimes necessary to replace excavated fill unsuitable for re-use. Figure 2 shows previously extracted unbound material ready for reinstatement. The core is then grouted back into place to match the original surface level.

Figure 1 - Specialist equipment for core and vac operations



Owing to the relatively small size of the opening, use of the technique depends on knowing precisely where buried apparatus is located. In addition, specially developed tools are required to enable repairs and reinstatement to be carried out by operatives working from the surface. Some examples of these tools are shown in Figures 3 and 4.

Core and Vac should not be used where there is a risk of cutting through services located within bound layers, such as fibre optic cables that have been installed using the micro-trenching technique.

### The benefits

In general, the width of a Core and Vac road closure is less than that required for conventional excavations even allowing for the specialist truck-mounted equipment (see Figure 5). In addition, the contractor is able to restore the site relatively quickly if circumstances change resulting in the road having to be reopened as soon as possible.

National Grid have found that Core and Vac typically reduced works duration from five days to half a day. Between April 2011 and March

2014 in London alone, they estimate that the use of Core and Vac reduced delays to the travelling public by 5670 days. The excavated volume in Core and Vac operations is typically about 20% of that involved in traditional excavations. This results in a considerable reduction in lorry movements of excavated material and imported fill. Over the same period in London, National Grid estimate that Core and Vac reduced the amount of material involved by some 1700 tonnes.

Traditional rectangular excavations affect relatively large road surface areas and can weaken the surrounding pavement because of stress concentration at the corners. It is also difficult to ensure full compaction of unbound materials in the corners. An equivalent Core and Vac excavation has a much smaller footprint and its circular shape makes compaction easier.

Core and Vac reinstatements tend to be more robust than those of conventional excavations, and skid resistance is unchanged. Marking the core before extraction helps ensure it is orientated correctly on reinstatement, and after a short period of trafficking, the repair tends to blend in with the road - see Figures 6 and 7.

Figure 2 - Core and Vac in use



Figure 3 - Long-handled Stilson wrench



Figure 4 - Hand-held pole tamper



Figure 5 - Core and Vac site



Figure 6 - Appearance of reinstatement on completion



Figure 7 - Reinstatement after 2½ years



## The process

Figures 8 to 13 illustrate the various stages of a typical core and vac operation in a flexible construction pavement.

Figure 8 - Lorry mounted core drill delivered to site



Figure 11 - Carrying out repairs from the surface using specialist tools



Figure 9 - Coring through the bound layers



Figure 12 - Reinstating unbound material in layers, and checking compaction with a peizo sensor and a compaction monitor



Figure 10 - Vacuuming out the exposed unbound material, after loosening where necessary

Figure 13 - Grouting the core back into place to match the original surface level and orientation



## Recommended further reading

- Avoiding Danger from Underground Services, HSG47 <http://www.hse.gov.uk/pubns/books/hsg47.htm>
- Specification for the Reinstatement of Openings in Highways. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/11042/sroh.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/11042/sroh.pdf)
- Manual handling. (The Health & Safety Executive). <http://www.hse.gov.uk/toolbox/manual.htm>
- The safe use of vehicles on construction sites: A guide for clients, designers, contractors, managers and workers involved with construction transport. (The Health & Safety Executive). <http://www.hse.gov.uk/pubns/books/hsg144.htm>
- The Construction (Design and Management) Regulations. <http://www.legislation.gov.uk/ukxi/2007/320/contents/made>
- New Roads and Street Works Act 1991. <http://www.legislation.gov.uk/ukpga/1991/22/contents>
- The Street Works (Records) (England) Regulations 2002. [http://www.legislation.gov.uk/ukxi/2002/3217/pdfs/ukxi\\_20023217\\_en.pdf](http://www.legislation.gov.uk/ukxi/2002/3217/pdfs/ukxi_20023217_en.pdf)
- The Construction Plant-hire Association publications. <http://www.cpa.uk.net/publications/>

## Contact details

Traffic Division  
Department for Transport  
3/27 Great Minster House  
33 Horseferry Road  
London  
SW1P 4DR  
Tel: 020 7944 2974  
E-mail: [traffic.signs@dft.gsi.gov.uk](mailto:traffic.signs@dft.gsi.gov.uk)  
[www.gov.uk/dft](http://www.gov.uk/dft)

The Construction Plant-hire Association  
27/28 Newbury Street  
London  
EC1A 7HU  
Tel: 020 7796 3366  
Email: [enquiries@cpa.uk.net](mailto:enquiries@cpa.uk.net)  
<http://www.cpa.uk.net/home/>

Health and Safety Executive  
<http://www.hse.gov.uk/contact/>

The DfT sponsors a wide range of research into traffic management issues. The results published in these Traffic Advisory Leaflets are applicable to England and Wales, subject to variations in statutory provisions or administrative practices between the countries. Within England, enquiries should be made to: Traffic Division, Department for Transport, 3/26 Great Minster House, 33 Horseferry Road, London, SW1P 4DR. Telephone 020 7944 2974. E-mail: [traffic.signs@dft.gsi.gov.uk](mailto:traffic.signs@dft.gsi.gov.uk)

To join the publications mailing list, send an e-mail with the subject "subscribe" to [TAL@dft.gsi.gov.uk](mailto:TAL@dft.gsi.gov.uk)