# **Underground Services**

# Effective Planning, Management and Undertaking of the Works

### Introduction

- The only way to avoid damage to underground services is to keep away from them and do not excavate near them
- The more you excavate near services, the more likely is the risk of damage.
- Nobody likes excavating near services

# Do You Agree?

#### **On New Housing Developments**

- The majority of service strikes occur within the 2m service strip
- The majority of services are damaged by mechanical excavators
- The majority of damage is to electricity cables
- The majority of service strikes are avoidable

# Why do Service Strikes Happen?

- 1. Unaware of underground services
- 2. Not following procedures
- 3. Accidental damage
- 4. Poor design
- 5. Poor planning of the work

# 1. Unaware of underground services

- Drawings not checked
- No drawing available
- Services not shown on drawings
- Assuming no services present
- No survey carried out (PAS 128)

# 2. Not following procedures

- Not checking drawings
- Not scanning
- Not digging trial holes
- Machine excavating too close to services
- Machine operator trying to help

# 3. Accidental damage

- When hand digging
- When removing material
- Wear & tear on old services
- Unauthorised repairs (previously)
- Poorly backfilled stones, etc
- Installed incorrectly
- Unaware of services present

# 4. Poor Design

- All services in congested areas
- Crossing points and junctions
- Services close to obstacles, foundations, etc

# 5. Poor Planning

- Insufficient time given to carry out the work
- Work carried out prematurely scaffolding nearby
- Work carried out in wrong sequence
- Services laid unnecessarily not required for significant time
- Poor liaison and communication between parties concerned

# Why do people break the rules?

#### Unintentional

- lack of knowledge,
- don't know any better
- distractions

#### Deliberate (Behavioural?)

- don't see or agree with the need,
- peer pressure,
- gets the job done quicker,
- got away with it before,
- its only a machine I'm safe

# Why do people break the rules-cont'd?

#### Routine

• becomes the norm because it is not challenged or enforced

#### Circumstantial

- timescales, urgency utility company coming,
- catch up for delays,
- foul weather conditions more likely to use machine

#### Very seldom done as a wilful act of vandalism or sabotage

# Consequences of service strikes

- Death or serious injury
- Impact on others e.g. householders, hospitals, businesses, etc
- Damage to individual/company's reputation
- Financial impact direct/indirect to the business
- Disciplinary action

# What can be done to prevent them?

- Design of the service strip.
- Utility companies to provide up to date "As Built" drawings and displayed on wall
- Correct installation of services to line and level.
- Correct backfilling, sand and tape.
- Minimise re-excavation at connection points
- Procedures
- Safe digging practices
- Reporting faults/bad practices

# Good practices & procedures

#### • Permit to dig (e.g. Traffic Light System)



- Check existing drawings
- Scan the area
- Mark line of service
- Hand dig trial holes (correct tools insulated)
- Safe use of excavator

Х The National Joint Unities Group

#### NJUG Guidelines on the Positioning of Underground Apparatus for New Development Sites



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Depth may be greater below carriageway than below footpath

### Depth of Services from Top of Kerb Log



#### Plant Crossing Service Strips







#### Services Waiting to be Connected





### Consideration of Methodology?

Looks okay on plan



In reality



#### Spaghetti Junction?







#### Good Planning/Practice?



#### Electric cable on ground with pot end

### What are the Areas Associated with Services?

- 1. New mains laid within the development (within service strips)
- 2. Plot connections to main services
- 3. Existing services present on site
- 4. Services for compounds, silos, sales areas, etc

#### 1. New Mains Laid Within the Site

- Multi-utility or separate companies (correct sequence)
- Who is the right person to excavate for services?
- Utility company usually want significant length of services to be laid
- Have services been installed correctly?
- Who is responsible for checking services laid correctly?
- Who maintains the excavation barriers, inspections?
- Who backfills when services installed? fines and tape / all?

## 2. Plot Connections to Newly Laid Services

- Who excavates for connections G/w or UC?
- Often last minute request
- Utility company often unreliable or time unspecific
- Utility company often won't accept open excavation what is correct size for single and multiple connections?
- Excavation can remain open for significant period. This affects pedestrian walkways.
- Temporary walkways on road seldom provided. Who should provide?
- Services subject to potential damage if left exposed
- Excavation close to scaffolds
- Service tracks to plots correct line and depth

### 3. Existing Services

- Should be able to be located if accurate records available
- Scanning with CAT and Genny doesn't always locate a service, including some HV cables.
- Sometimes CAT will pick up multiple signals
- CAT will not detect plastic pipes water, gas
- PAS 128 surveys
- Can services be diverted or isolated plan project schedules to allow sufficient time for this to happen.
- Support required to existing services

#### 4. Services to Compounds, Sales Areas, etc

- Often no records
- Route of service often not logical
- Service can be very shallow even on surface

### Services to Compound





Services for compound

### Mechanical v Hand Excavation

- Damage is possible with both options
- Normally greater damage to service using mechanical excavation
- But which is "SAFER" for individual carrying out the excavation?

### HSG47 (Third Edition 2014)

- 102 The danger created by damaging a gas pipe with an excavator is much greater than if the damage is done with a hand-held power tool,
- the opposite is true for work near electricity cables In other words- the **danger** created by damaging an electricity cable with a hand-held power tool is much greater than if the damage is done with an excavator.
- What about damaging a cable with simple hand tools? The dangers are still there.

#### HSG47

• 150 - Gas pipes may have projections such as valve housings, siphons and stand pipes that are not shown on the plans. To allow for this, do not use mechanical excavators within 500 mm of a gas pipe. The gas transporter may advise greater safety distances, depending on the pipeline pressure.

Type of Mains and Services	GAS MAP Identification	Hand Excavation required inside
Low Pressure (LP)	0 – 75mbar	0.5 metres
Medium Pressure (MP)	75mBar to 2 bar	0.5 metres
Intermediate Pressure (IP)	2 – 7 bar	3.0 metres
High Pressure (HP)	Above 7 bar	3.0 metres

- Developers say no mechanical excavation within 0.5m or even 1m in some cases from service.
- How do we install BT and street lighting? Not a practical option to hand dig over longer distances.

# Hard Ground

- How do you break it with hand tools?
- May require mechanical excavation
- Vacuum extraction and air lances only work in granular material which is easy to dig anyway.
- Can also damage old cables or eject loose particles.

# How do we make it safer?

- 1. Design
- 2. Planning
- 3. Eliminate re-excavation service box
- 4. Reduce re-excavation bags, etc
- 5. Get utility company to do it
- 6. Locate, identify and mark underground services
- 7. Safe digging practices

# 1. Design

- Designers have a duty to reduce or design out the risks arising from damage to underground services.
- If there are underground services present, the design should be amended to avoid them where possible
- Install BT and Street lighting into a separate track on other side.

# 2. Planning

- Carry out work in a logical manner
- Avoid installing all main services if not required
- Principal Contractor to allow adequate time to carry out the works
- PC to maintain communication between the companies involved

# 3. Eliminate Re-Excavation

Service Box

- Eliminates excavation for plot connections
- Need to come to one point for maximum efficiency







## 4. Reduce Re-Excavation

- Bags can be used and lifted out
- Remainder excavated by hand







# 5. Get Utility Company to Excavate

- Utility company to carry out their own excavations excavations less likely to remain open as long
- They are the "experts"

#### 6. Detect, identify and mark underground services

- Check existing drawings
- Scan the area if appropriate
- Mark line of service

# 7. Safe Digging Practices

- Hand dig for trial holes to expose services
  - Use insulated hand tools
  - Use spades and shovels preferably with foot pressure
  - Pointed tools may be used with care to break up hard ground
  - Do not use pointed tools in soft clay and soils
  - Keep careful watch for evidence of services during digging they are often out of position
  - Repeat checks with CAT and Genny as required
  - Report all unknown services uncovered
  - Treat all services as "live" unless told otherwise.
  - A live cable may be contained in an old pipe or conduit
  - Report any damage damage to services DO NOT attempt repairs
  - If possible, excavate alongside service rather than directly over the top

# 7. Safe Digging Practices - continued

#### • Safe use of Excavator

- Excavators will not be used until service drawings have been checked and any services located, marked and depths verified
- Ensure all involved in excavation are fully briefed
- A banksman will be present when mechanical excavation takes place
- The banksman should be in a position where they can see into the excavation to warn the driver of any services or obstacles and at a safe distance from excavator arm and bucket
- For BT and street lighting, the following procedures may take place
  - Trial holes at regular intervals (<5m) to locate services
  - Narrow , toothless bucket used to gently scrape ground to reduce level

# In Summary

- Nobody likes excavating near services
- To minimise the risks of injury or damage requires:
  - $\circ$  Improved Design
  - $\circ$  Good Planning
  - $\odot$  Eliminate or reduce re-excavation
  - $\circ$  Safe Digging Practices

# Any Questions?