Underground Utility Detection, Technology, Limitation & Solutions For Today and Future Development

"Technology And Application Towards Sustainable Development"

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(Technical Support and Application)

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RDG
RDG SUPPLY SDN. BHD.
One stop station for underground Utility Detection,
Inspection & Maintenance Technologies
www.rdg.com.my

PIONEERING SUSTAINABLE DEVELOPMENT AND ECO FRIENDLY COUNTRY THROUGH GOOD ENGINEERING PRACTIC, TECHNOLOGY AND APPLICATION

Contents

- Why need underground utility detection?
- What are the technologies used for construction of utility & technologies used for utility detection?
- Limitation of technology!
- Solutions to overcome HDD installed pipeline and duct as-built information requirement..

We need underground utility detection and information for…

- To aim for ZERO INTURRUPTION to buried utility due to third party negligence!
- To ensure EXACAVATION SAFETY!
- Utility damage PREVENTION!
- Project DESIGN!
- Project COSTING and budgeting!
- GOOD ENGINEERING PRACTICE for effective, sustainable and environmental friendly maintenance requirements!
- Etc…

What info that UT detection and mapping given… ?

- Where are the utilities ?
  (location and alignment)

- Is there any power cable or oil & gas pipe?
  (high profile utility)

- What is it buried depth?
  (Estimation depth reference)

Installation/construction of underground infrastructures

Open Trench

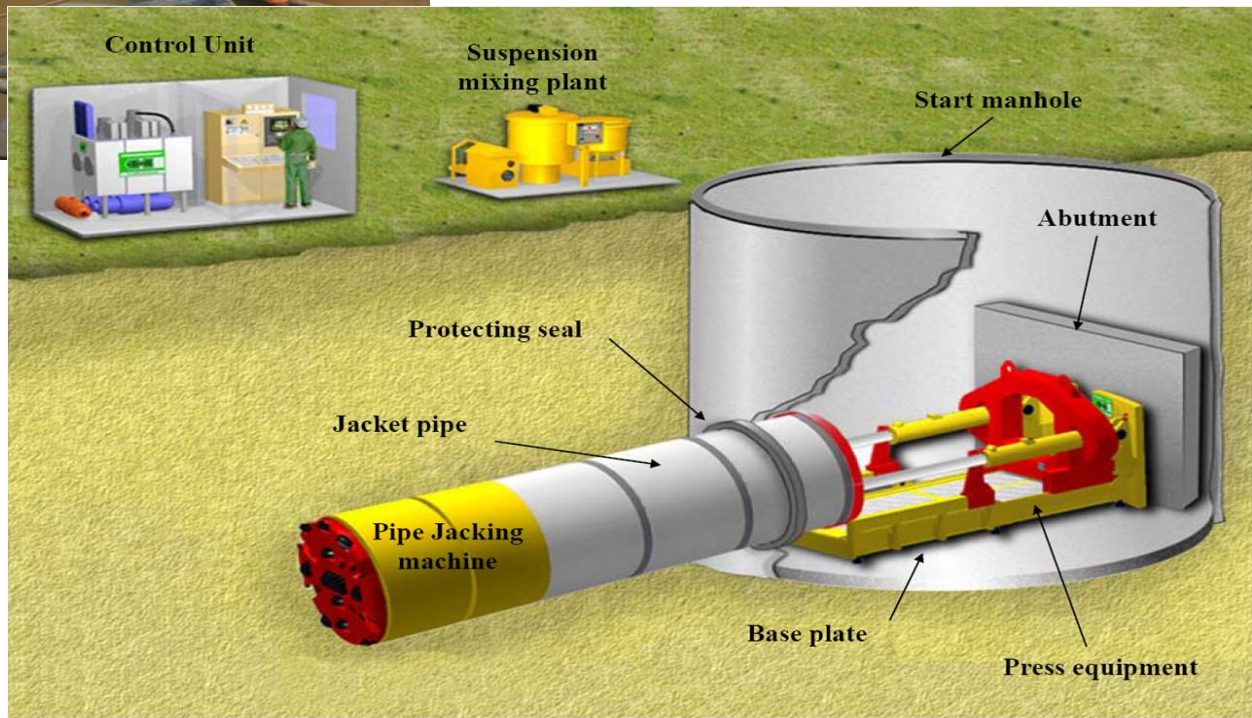
Microtrenching

Trenchless Technology (TT)

- HDD-Horizontal Directional Drilling

Trenchless Technology (TT)

- Pipe Jacking



Underground Cable

See What Happen When You Go Through An Electricity Cable…!

See What Happen When You Go Through An Electricity Cable…!

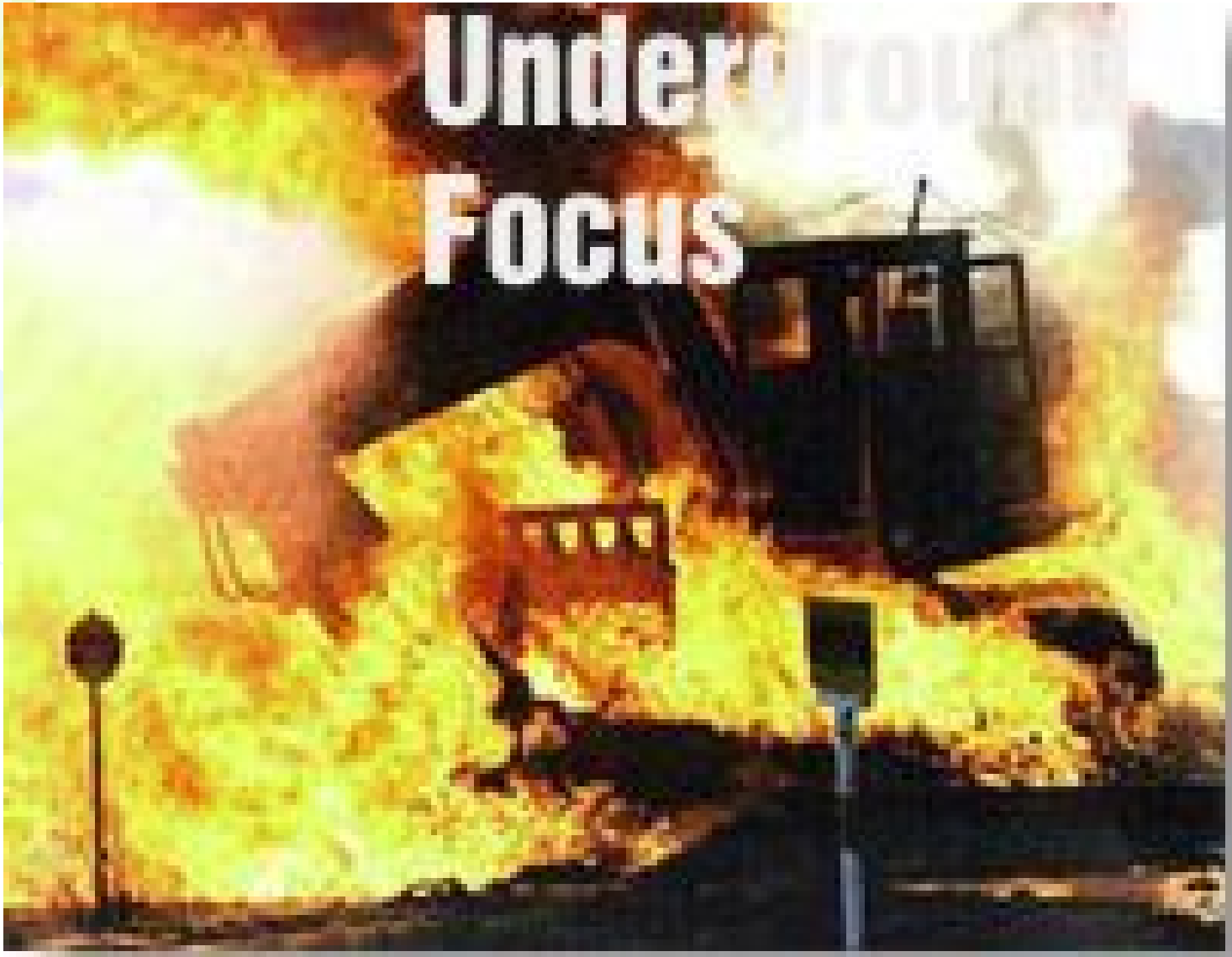
Tarnished and jeopardized of city image by primitive maintenance approach! (Unnecessary by-pass cables)

Oops!!

DANGER - High Voltage!

This practice has to be stopped immediately!

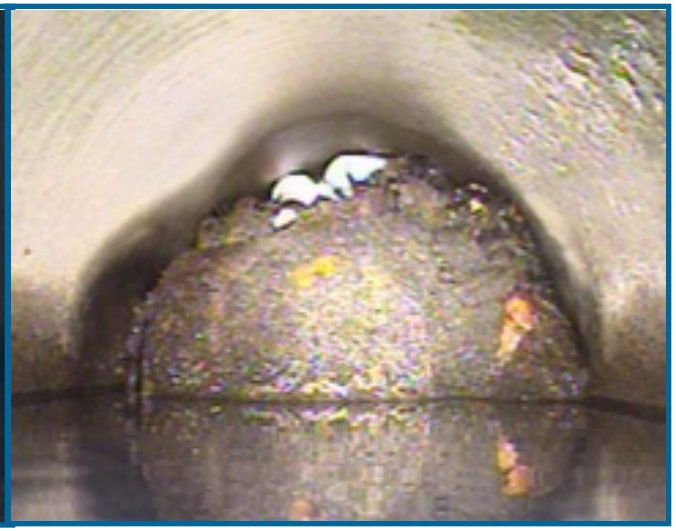
Environmental and Health Impact…Gas Pipe Explosion


Under
Focus

EXCAVATOR HIT ON WATER PIPE CAUSED FLOOD AND WATER SUPPLY INTERRUPTION


derground

Over polluted of air quality and drainage blockage due to unnecessary excavation!



Damaged to drainage pipe due to negligence! (Fencing Pole)

Jeopardized the financial institution, insurer and nation's money from "negligence" contractors!

Types of utility may be present on site…

- Power cables
- Oil & Gas pipes
- Communication cables
- Water pipes
- Sewer pipes
- Heating pipes
- Ventilation pipes
- Etc…

Types of material used…

- **Pipes**

-Metallic :MS, GI, DI, CI, Copper, Stainless steel & etc.

-Non-metallic: AC, PVC, HDPE, MDPE..

- **Power cables** : Metallic
- **Communication cables**:

-Metallic: Twisted copper pair

-Non-metallic: Fibre Optic

Technologies Available For Subsurface Utility Survey, Detection and Mapping

"Total Solution"

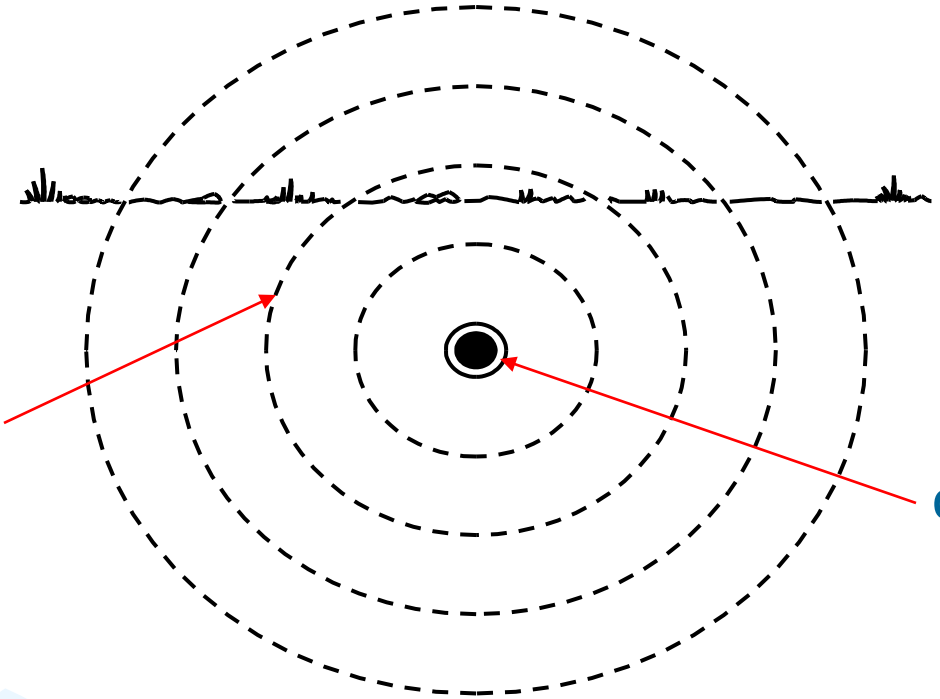
Technologies use for UU detection…

- EM Cable & Pipe Locator
- Flexi Rod and Sonde
- Flexi Trace
- Ground Penetration Radar (GPR)
- ***Inertial Locator/Orientation Measurement Unit (OMU)***

vLoc Pro2 Locator

- DUAL CORE Processor for real time response and depth reading
- 5 antennas designed
- Standard come with >45 selectable frequencies
- Carbon fibre
- Built-in rechargeable battery
- Colour Dot Matrix Display
- Firmware Free Upgrade

Magnetic field is …



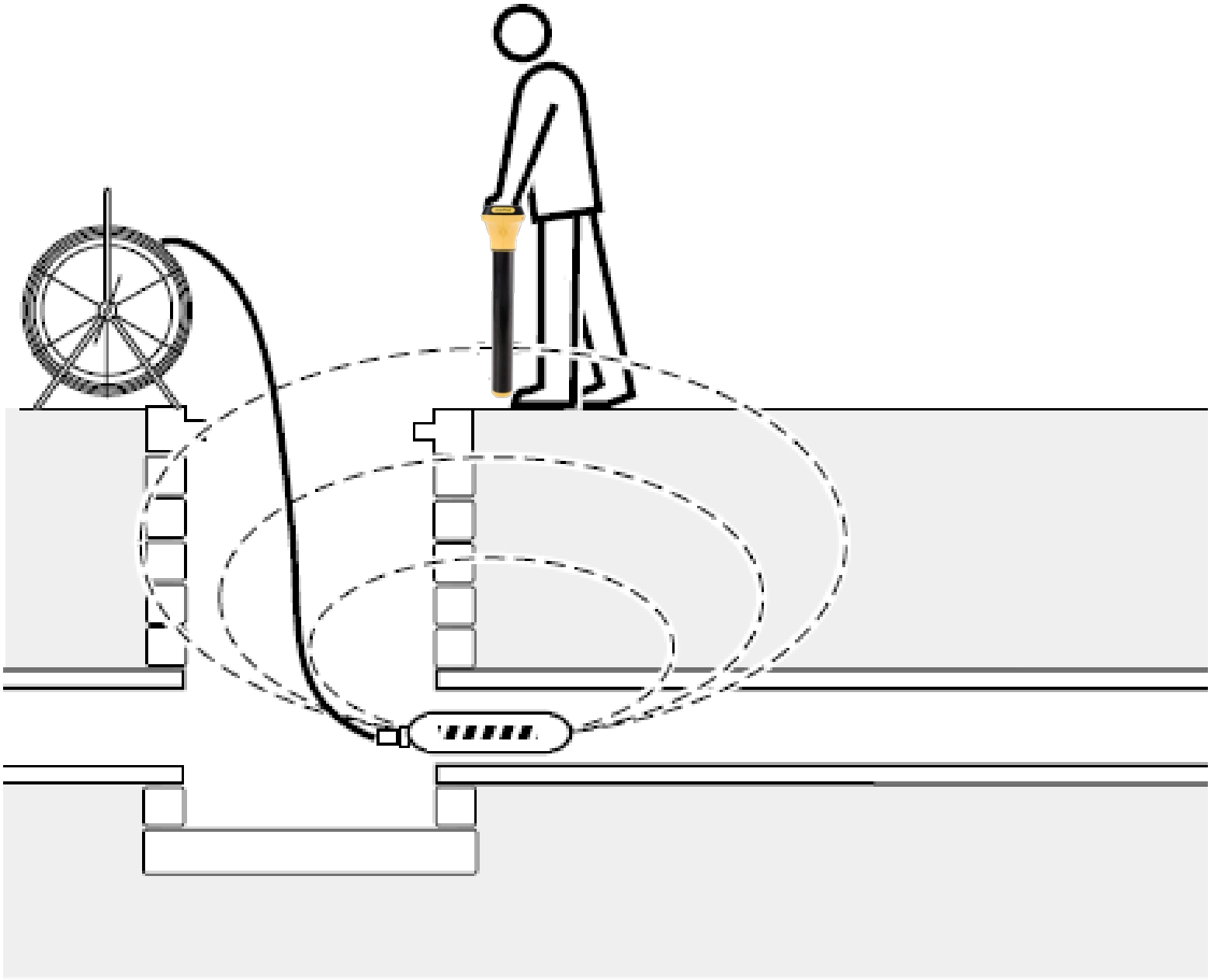
… radiated by a current carrying conductor

Non-metallic Utility, Sewer or Duct

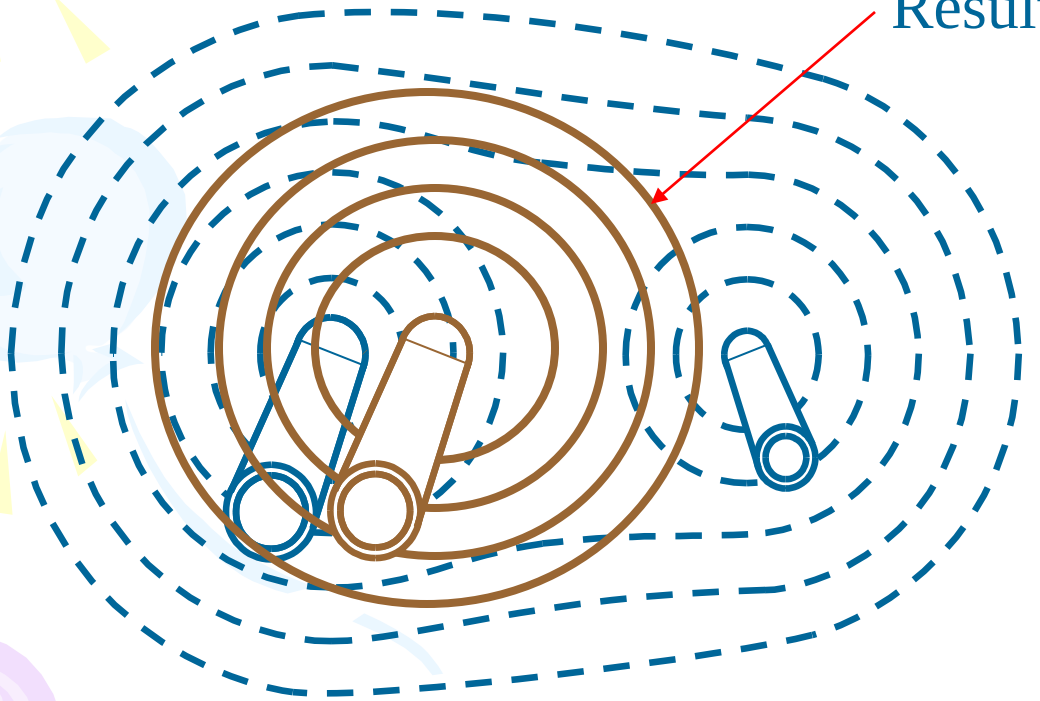
Flexi Trace

Flexi Rod

Sonde



Limitation: Signal distortion



Distortion field may appear to come from a different point.

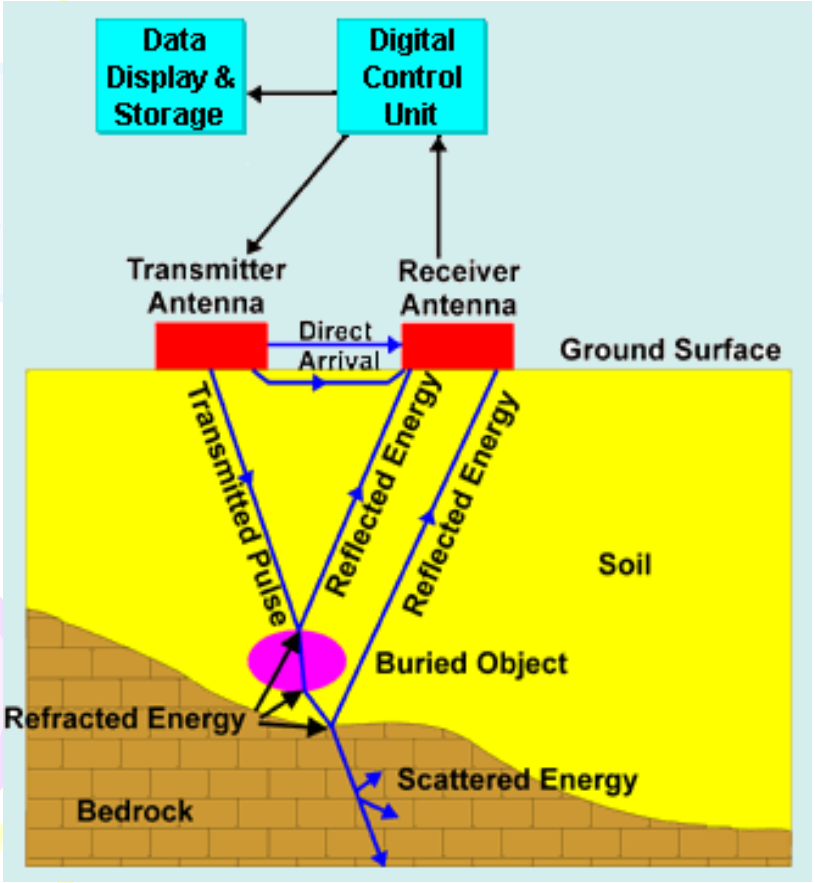
GROUND PENETRATING RADAR (GPR)

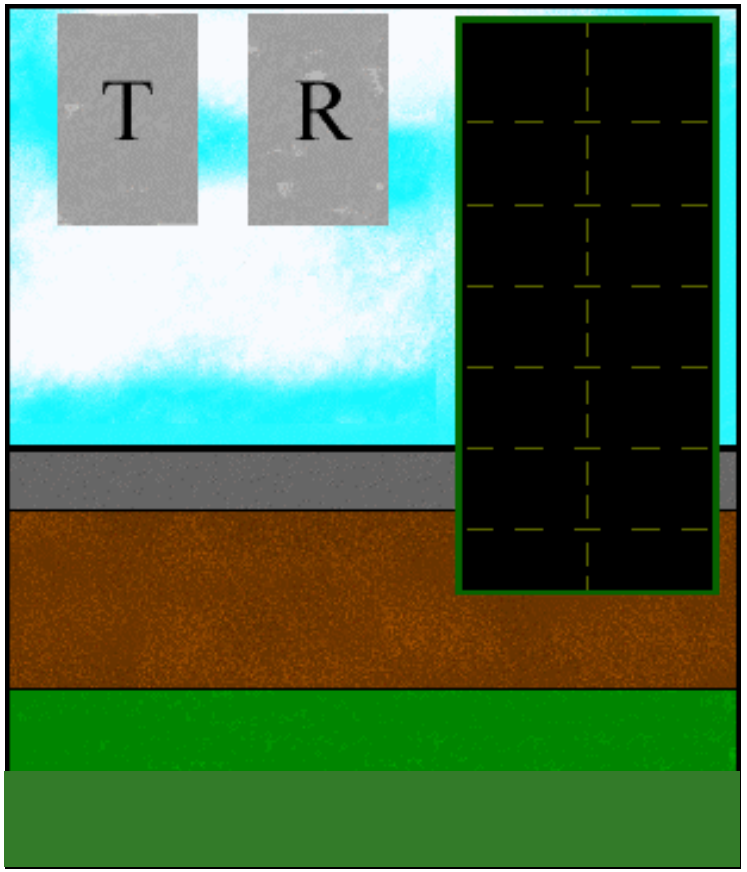
Simultaneous Dual Frequency
2-in-1 High Resolution System

TECHNOLOGY INTRODUCTION

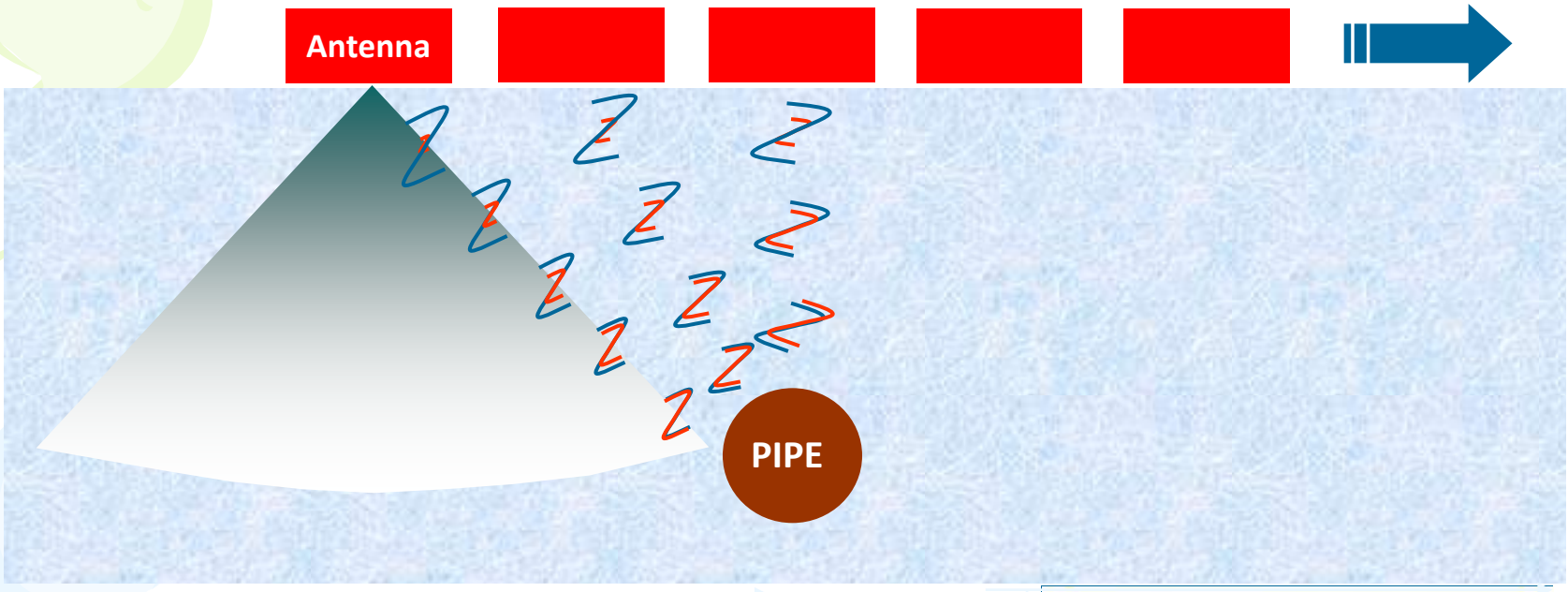
GROUND PENETRATING RADAR (GPR)

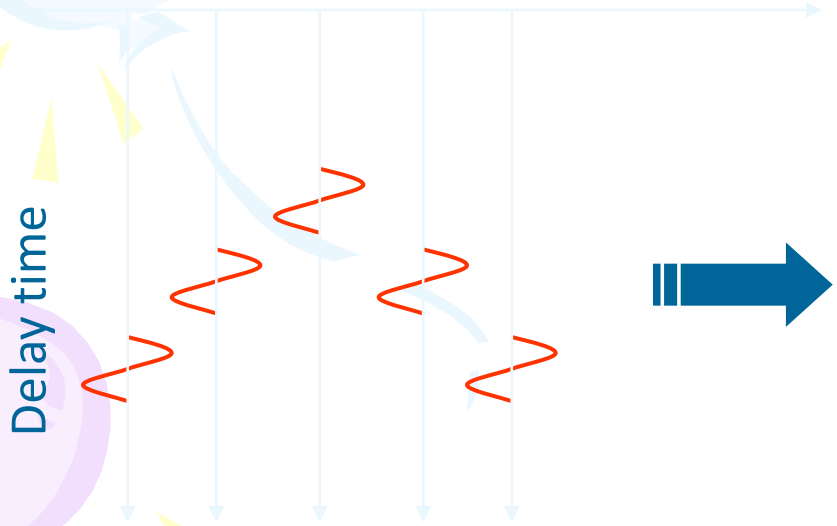
GPR is a method developed for shallow, high-resolution, subsurface investigations of the earth. GPR uses high frequency pulsed electromagnetic waves (from 25 MHz to 2,000 MHz) to acquire subsurface information.

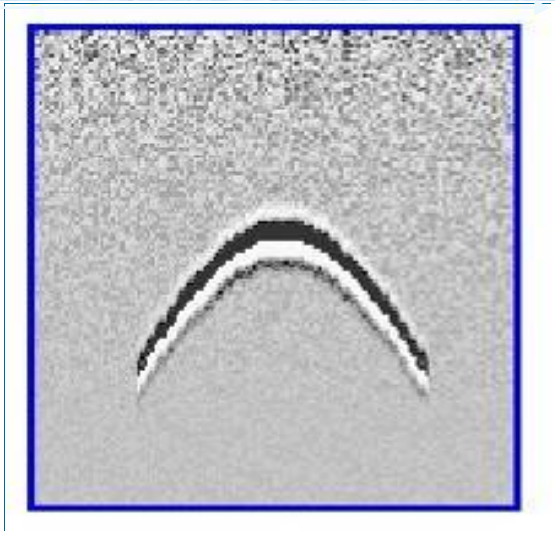




TECHNOLOGY INTRODUCTION

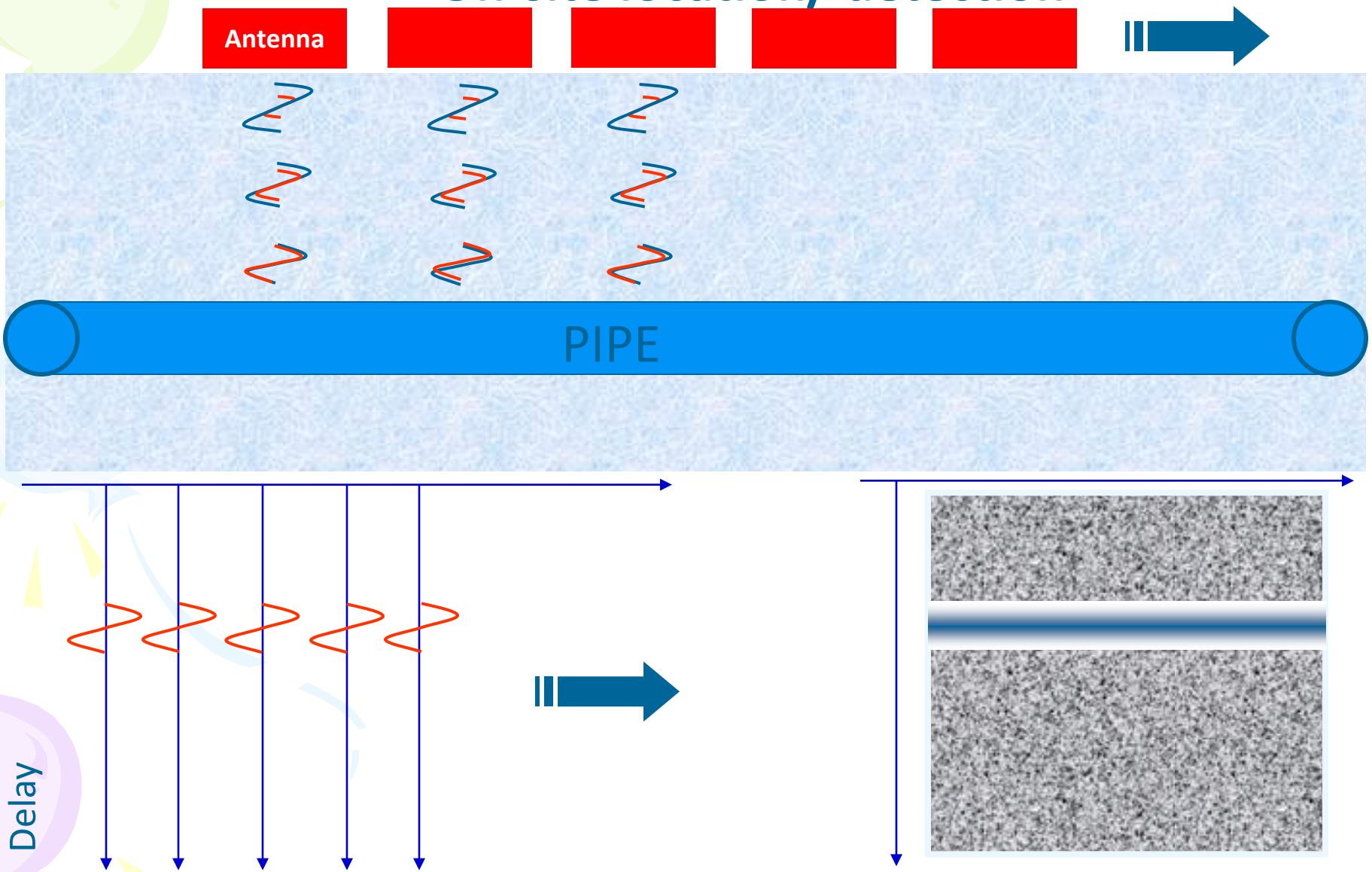


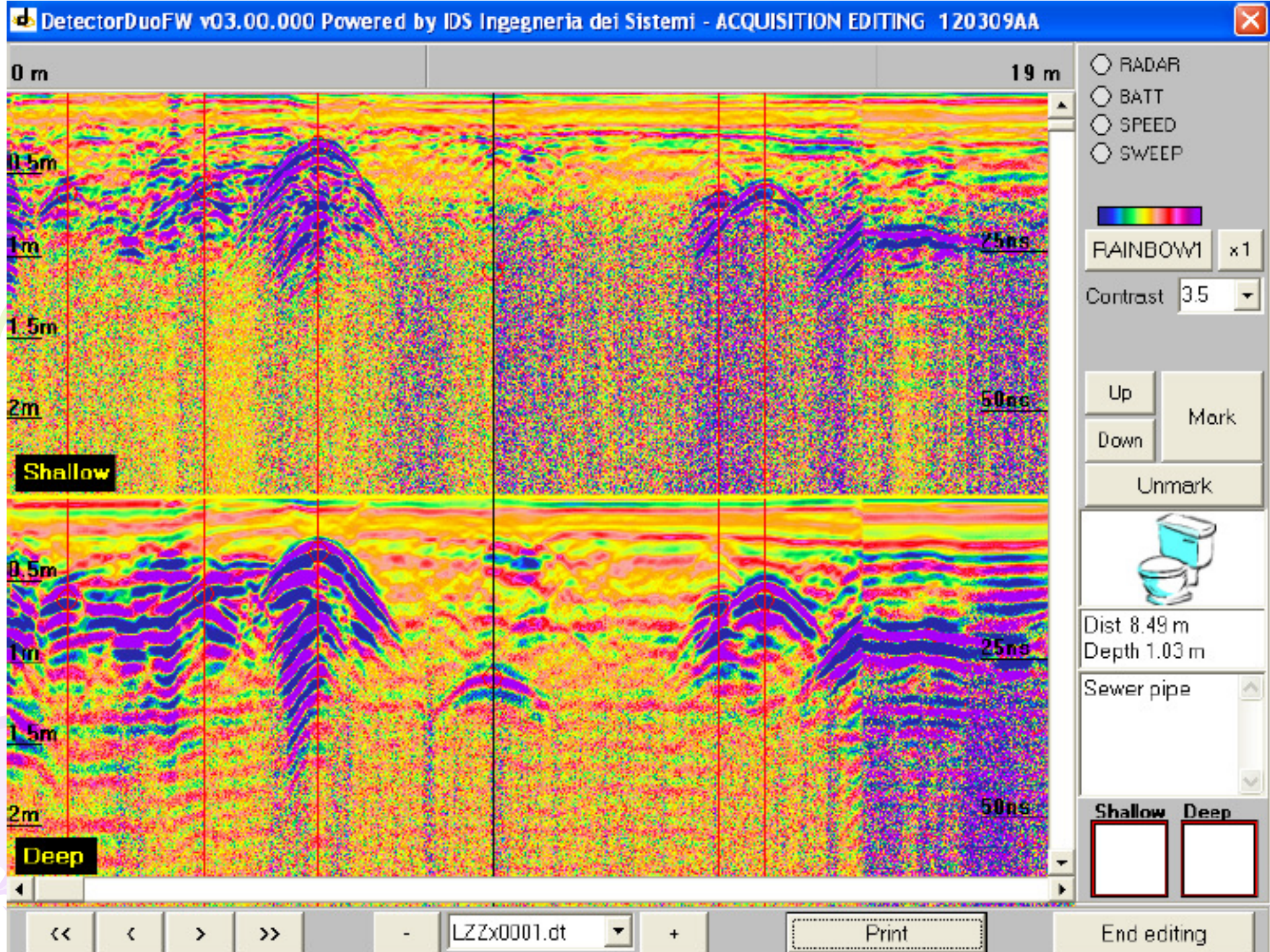




TECHNOLOGY INTRODUCTION

On-site location/ detection




DetectorDuoFW v03.00.000 Powered by IDS Ingegneria dei Sistemi - ACQUISITION EDITING 120309AA
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19 m
0.5m
1m
1.5m
2m
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Shallow
0.5m
1m
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2m
25ns
50ns
Deep
RADAR
BATT
SPEED
SWEEP
RAINBOW1
x1
Contrast
3.5
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Mark
Unmark
Dist 8.49 m
Depth 1.03 m
Sewer pipe
Shallow
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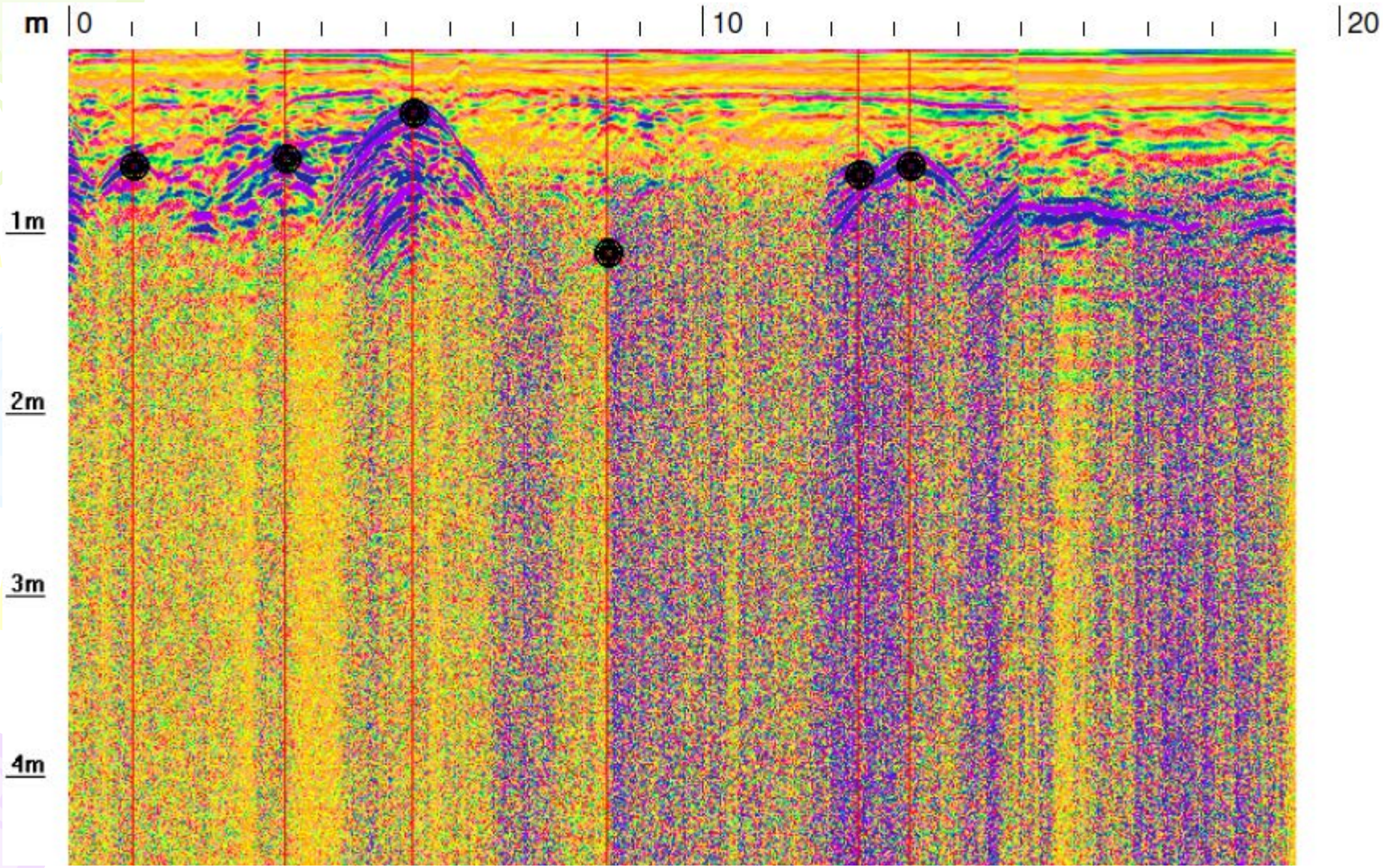
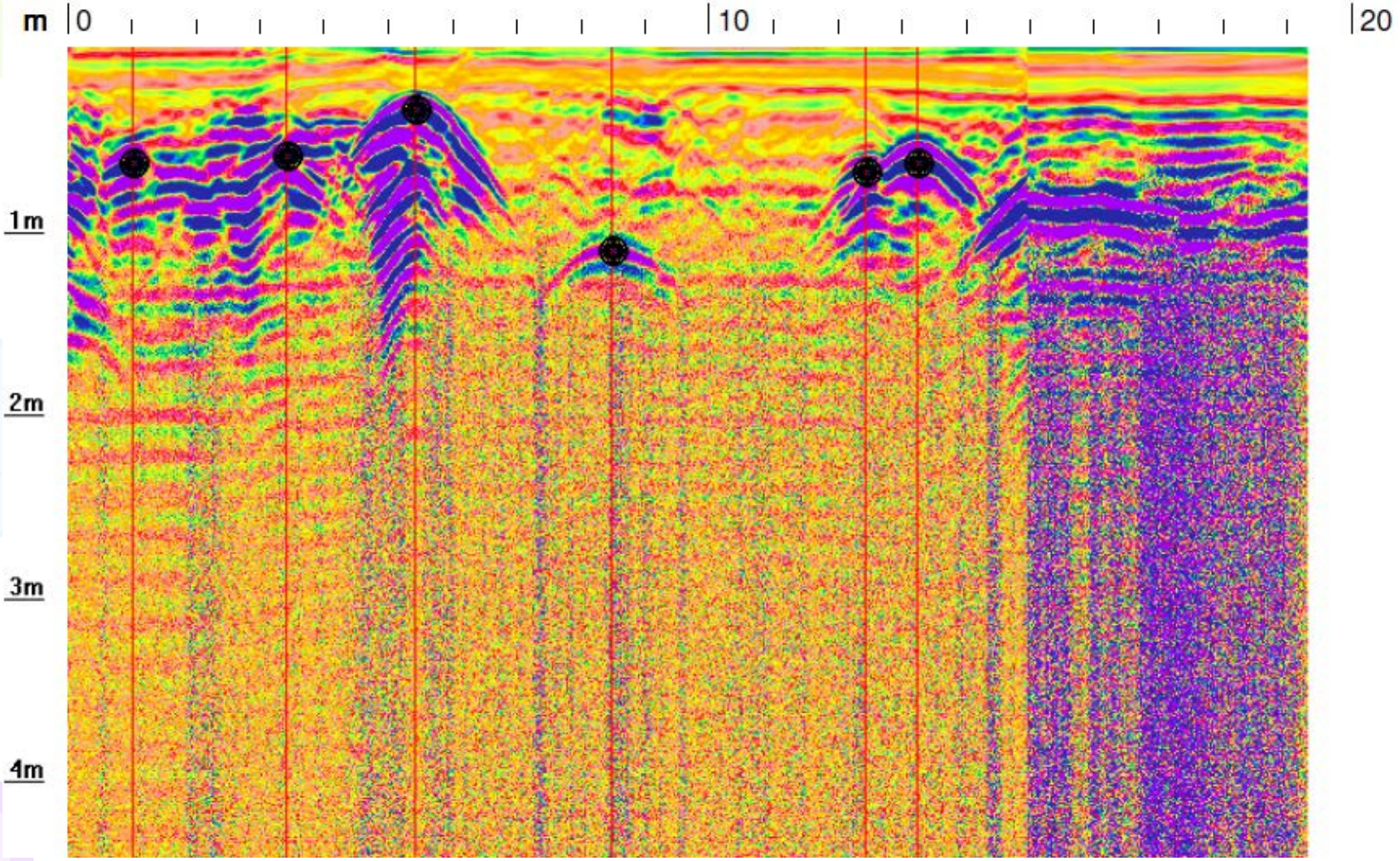
Important of frequency used vs information collected



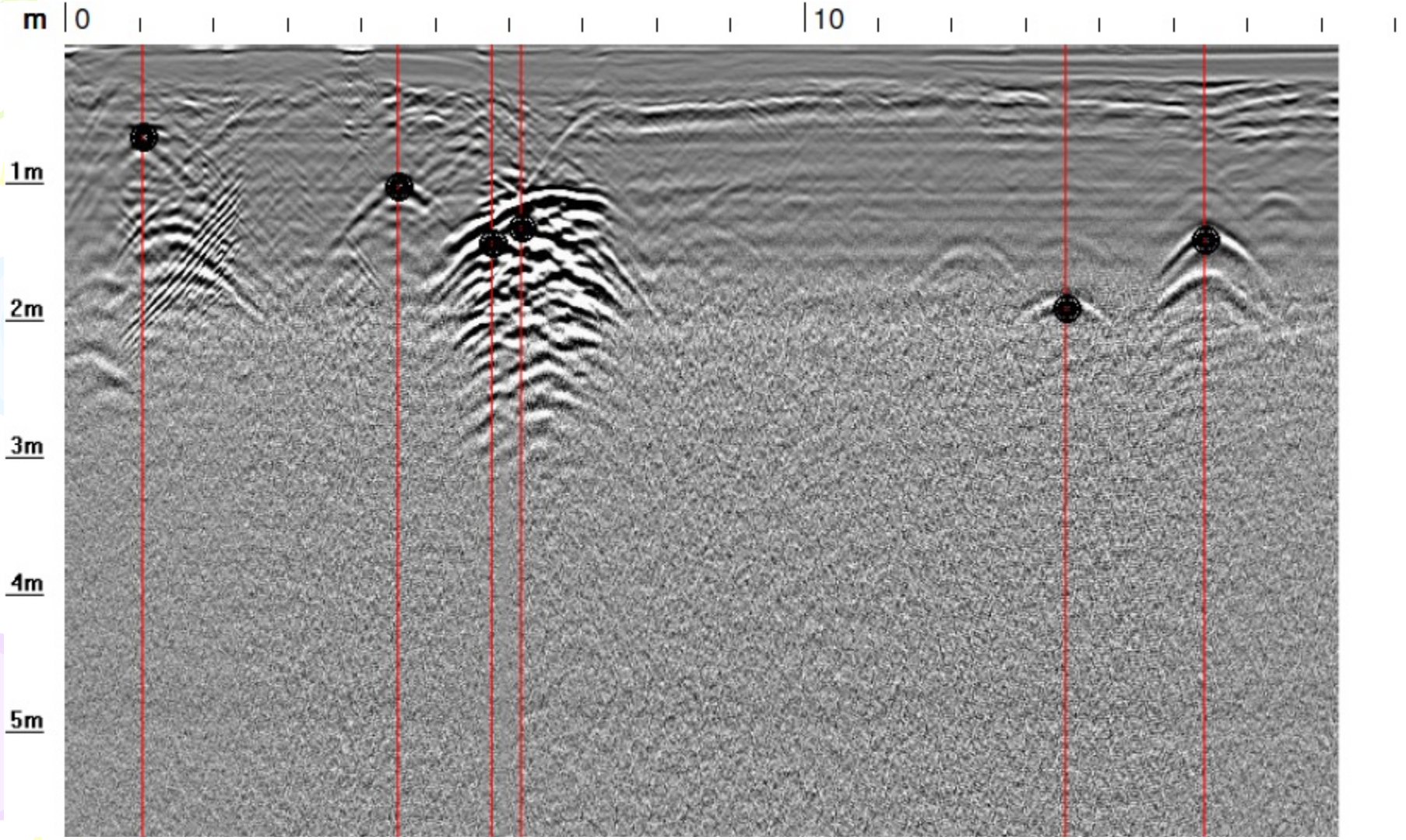
High frequency – high resolution – shallow depth

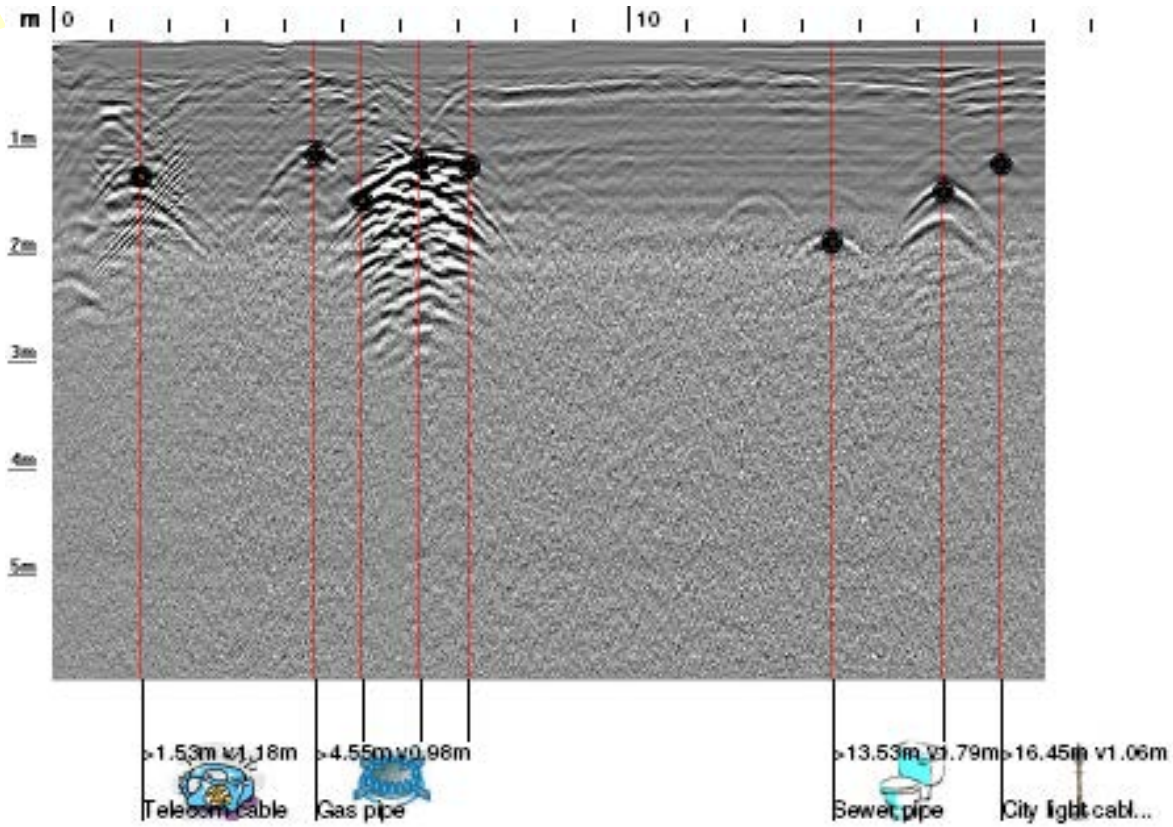
Important of frequency used vs information collected



Low frequency – low resolution – deeper depth

Radargram MUST be submitted as part of deliverable report !



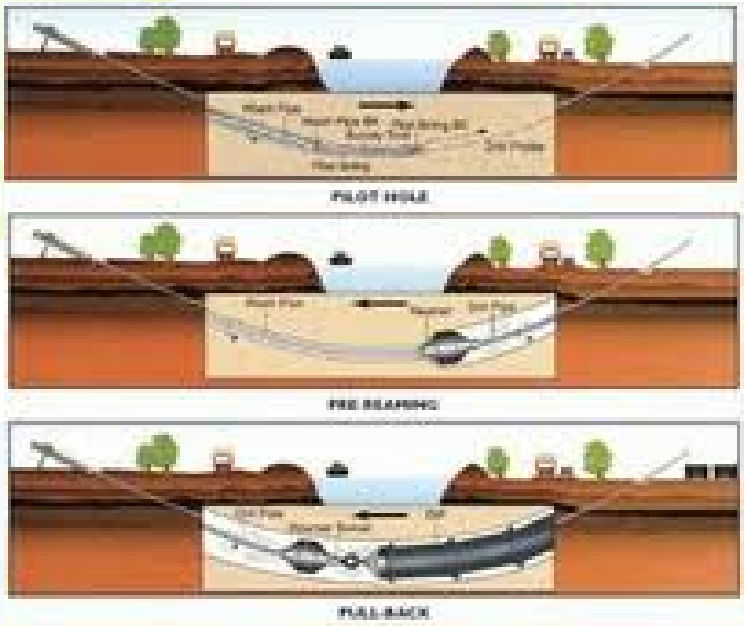

m
0
10
1m
2m
3m
4m
5m
1.53m v1.18m
Telecom cable
4.55m v0.98m
Gas pipe
13.53m v1.79m
Sewer pipe
16.45m v1.06m
City light cabl...
5.36m v1.4m
Power cable
15.45m v1.31m
Water pipe
6.38m v1.06m
Power cable
7.22m v1.09m
Power cable

Limitation of Electro-magnetic based technology:

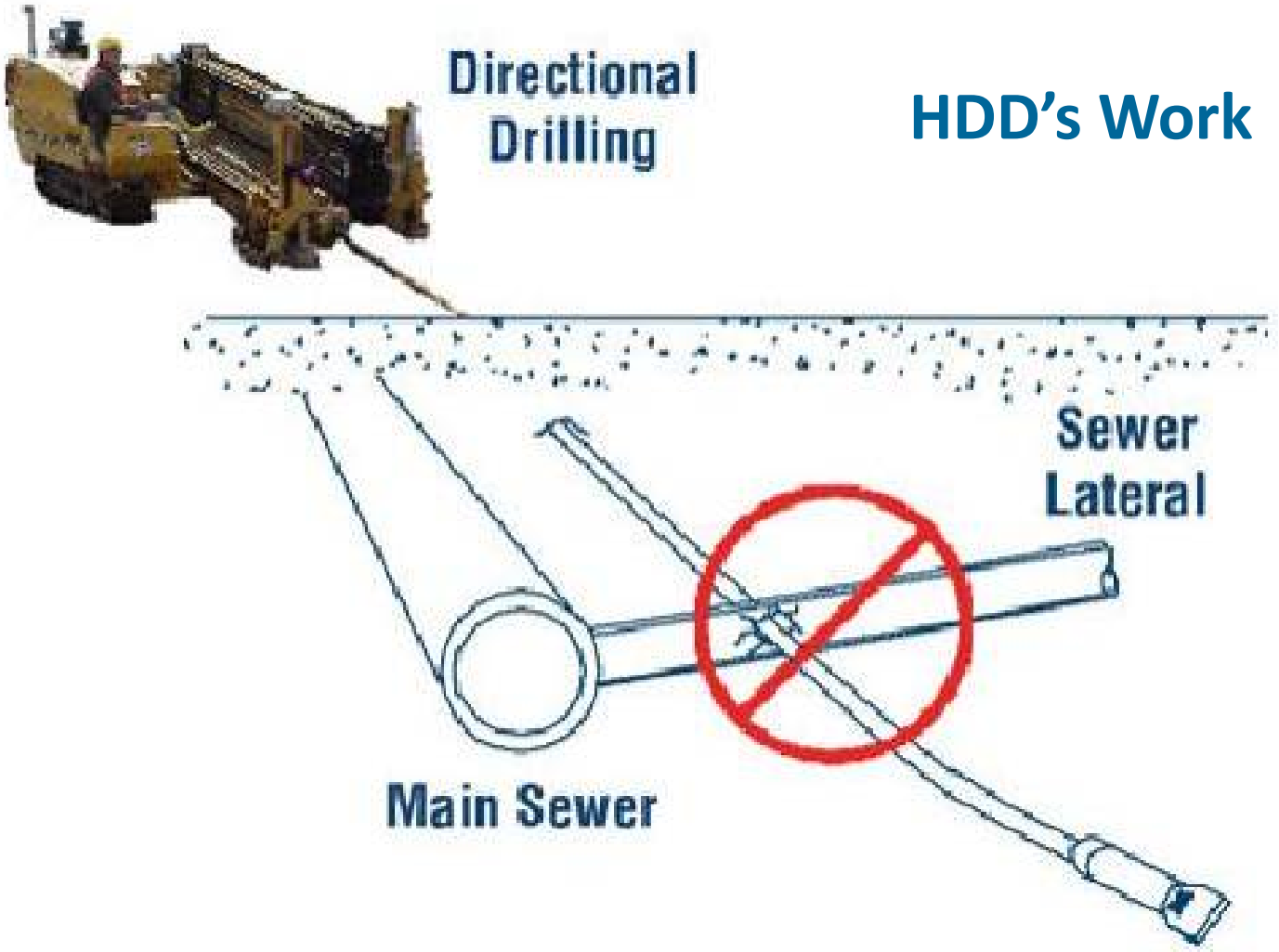
- magnetic field interference to or from adjacent utility (EML)
- interference by HV cable (EML)
- depth limitation (GPR & EML)

Above are the key problems which cause difficulty or almost impossible to locating most of the HDD installed utility!!

Horizontal Directional Drilling (HDD)



How often does this happen?




223.8 FT
GAS LINE IN SEWER BY HDD
INSTALLATION