

# FINAL PROJECT SUMMARY

SEPTEMBER 13, 2024

## ORFEUS OBSTACLE DETECTION FOR HORIZONTAL DIRECTIONAL DRILLING

DOT-693JK31810010  
OTD 5.16.K.2





- 6 Leading companies have joined together to form further the development of the ORFEUS system, with financial support from DOT PHMSA and OTD.
- As a pioneer, developer and producer of trenchless technology, TRACTO plays a key role in the development project.





# ORFEUS Project Objective

- > The objective is to produce a field proven, market ready, obstacle location technology for use in horizontal directional drilling (HDD) applications.
- > ORFEUS is an effort aimed at developing a safe, cost effective “look-ahead” obstacle detection system for HDD equipment.
- > This project seeks to further develop the technology to bring forward a commercially viable product for identifying obstacles in and around the path of a HDD drill rig; therefore, reducing third-party damage to underground utilities.





SUN PRAIRIE, WI - 2018

GAS EXPLOSION DUE TO HDD DRILLING:

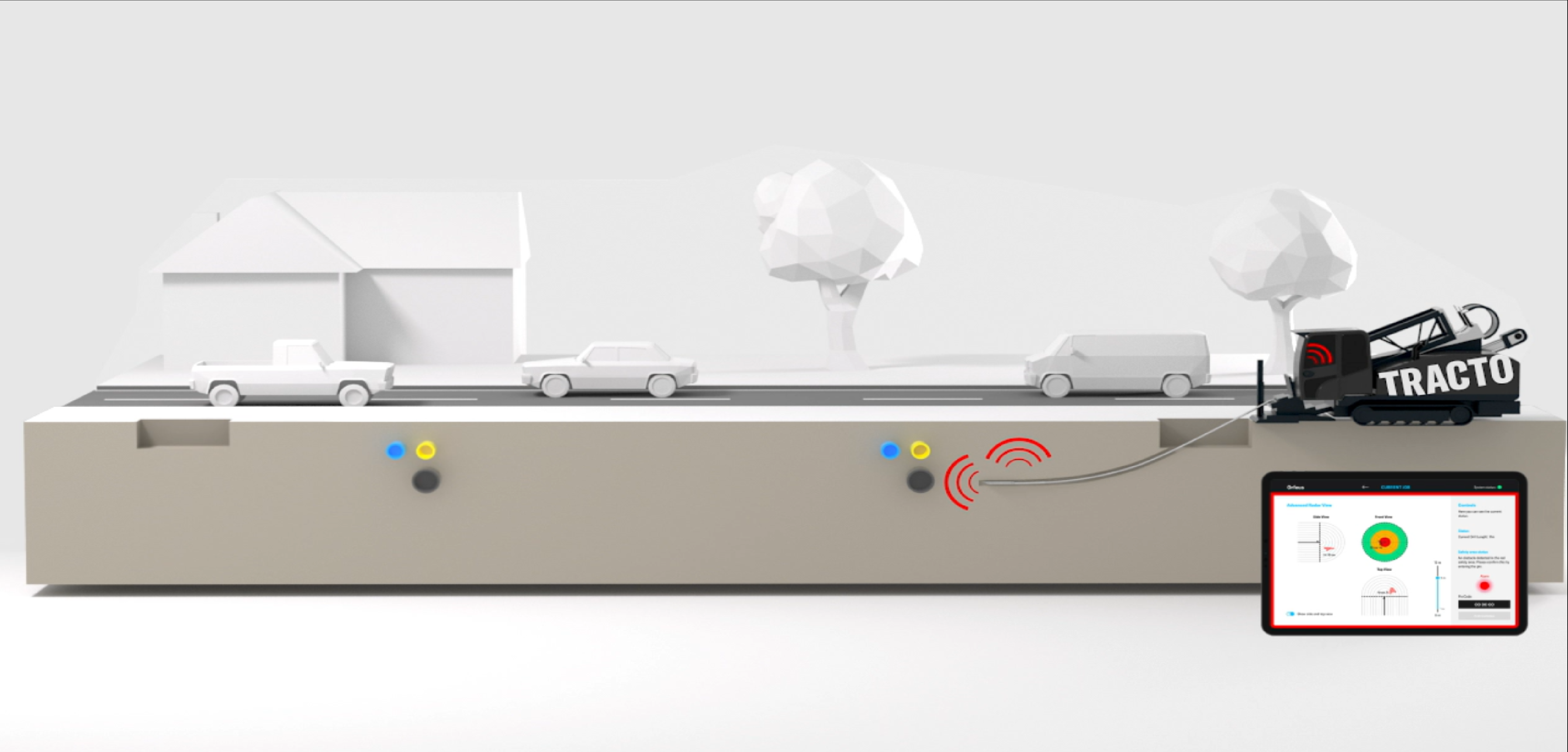
13.01.2023 BOCHUM, GERMANY;

- ONE PERSON FATALY INJURED
- ONE PERSON SLIGHTLY INJURED

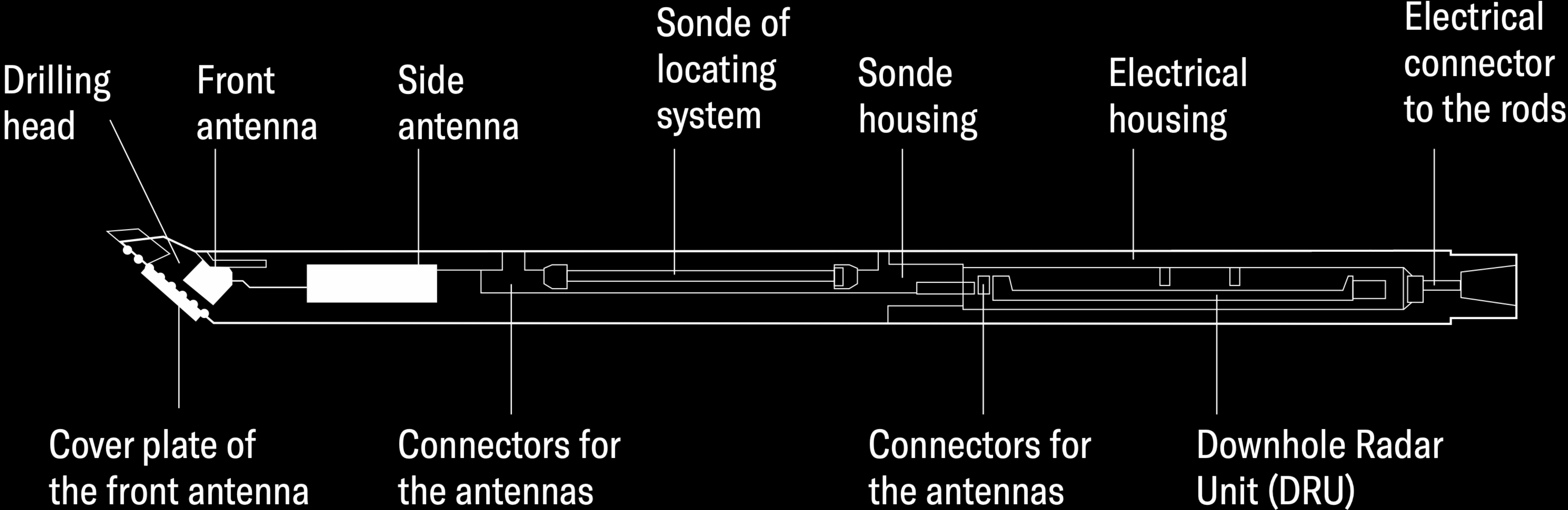
ORFEUS COULD HAVE SAVED THIS LIFE





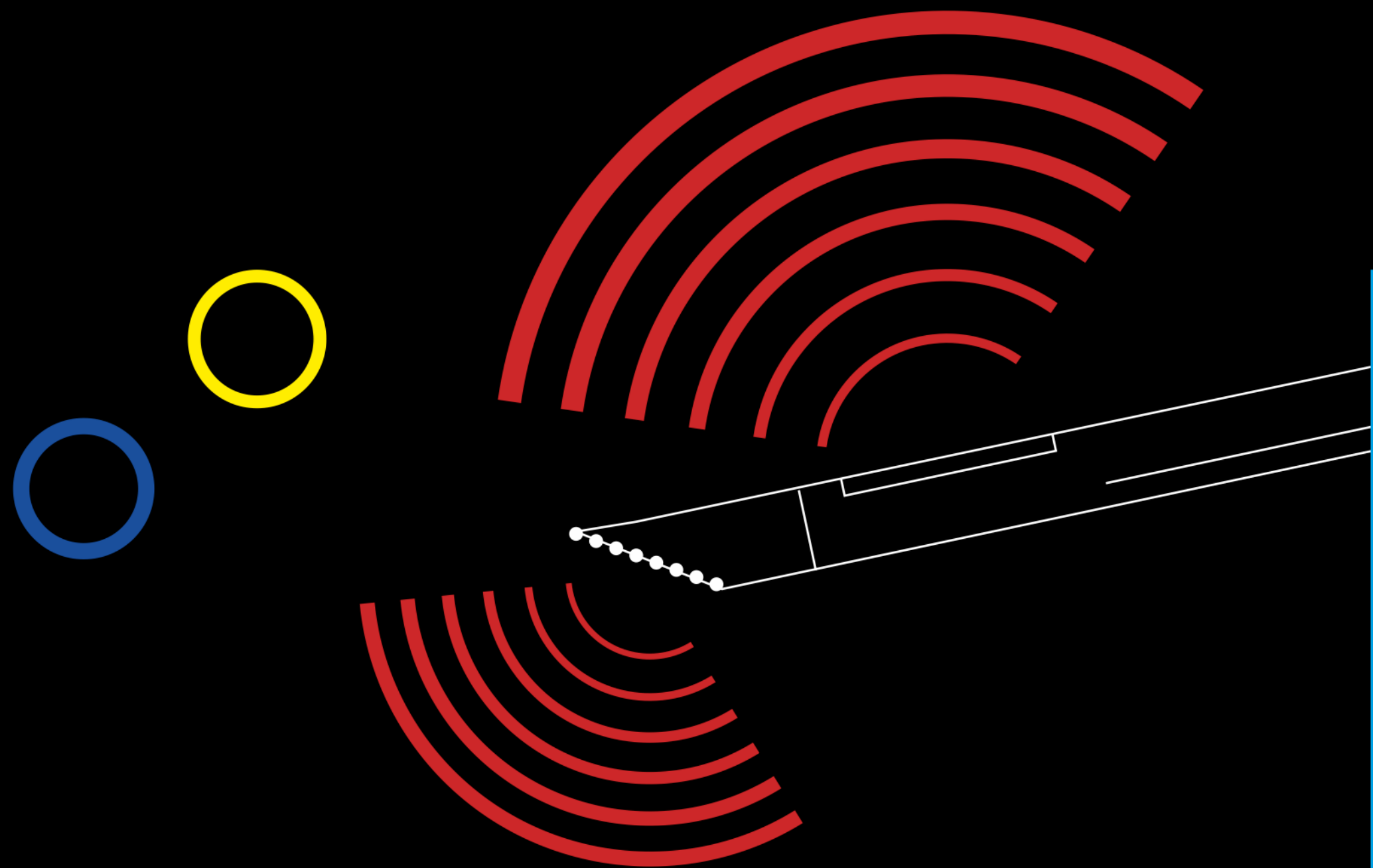








# THE USE OF TWO RADAR ANTENNAS MAXIMISES THE SCANNING RANGE.

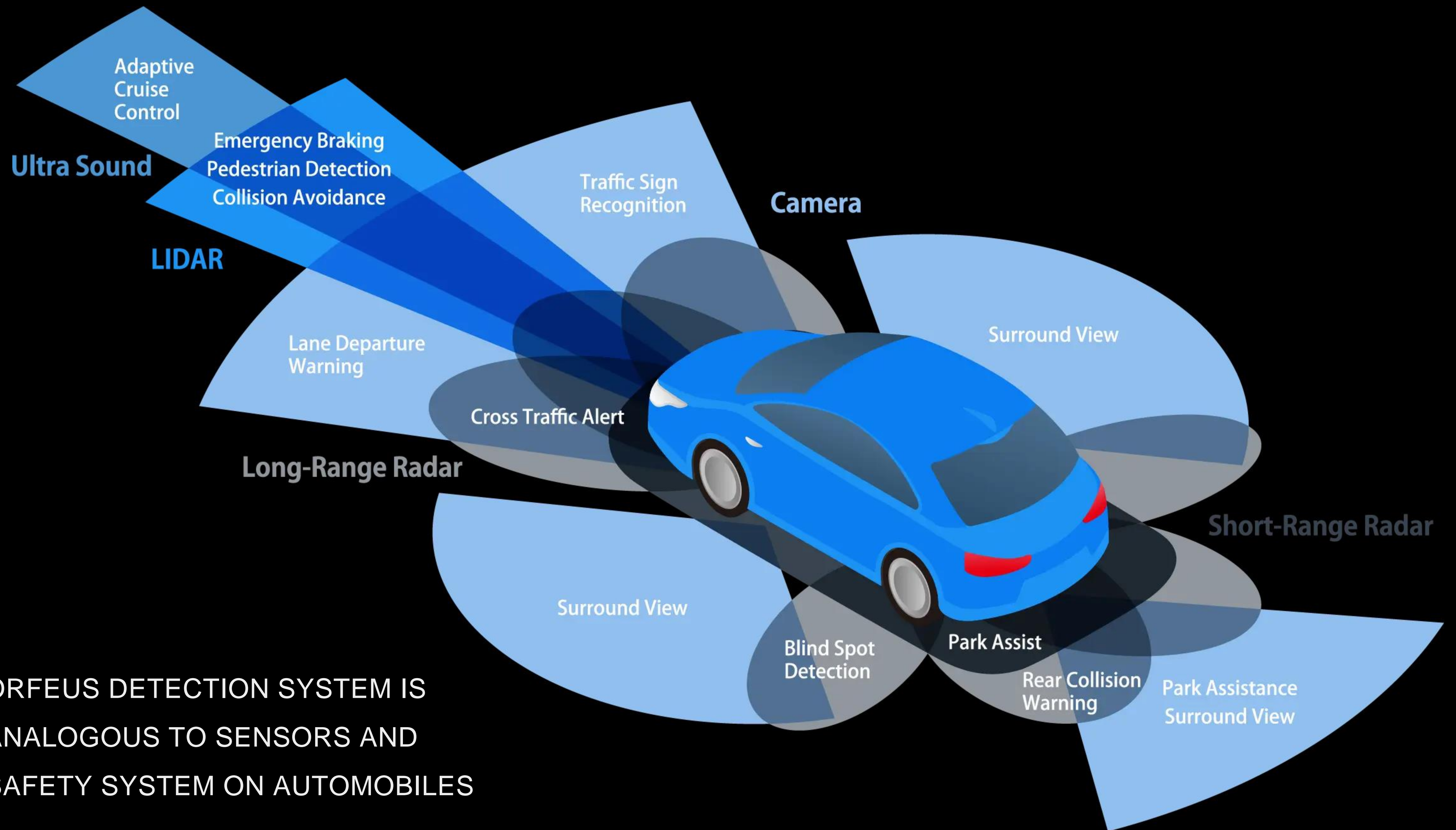


- Any possible obstacles – such as pipes or wires – are detected earlier at the decisive moment through the use of ORFEUS.
- The hardware evaluates the obstacles detected and responds if necessary.







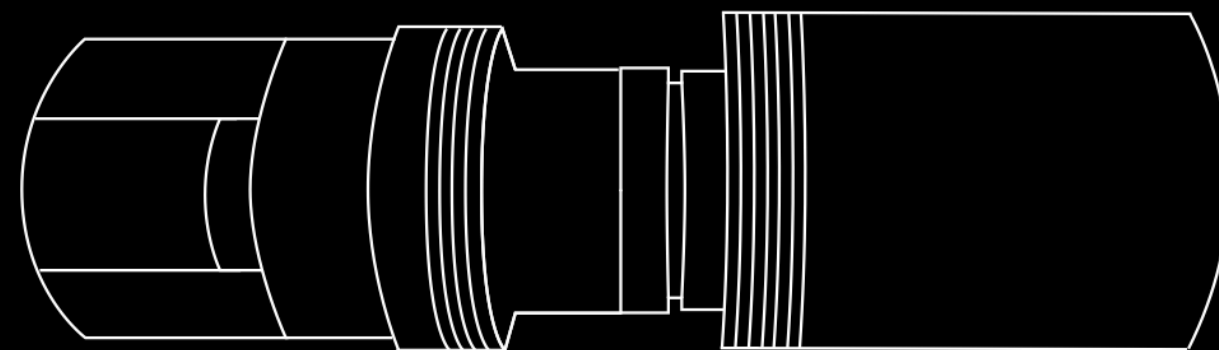
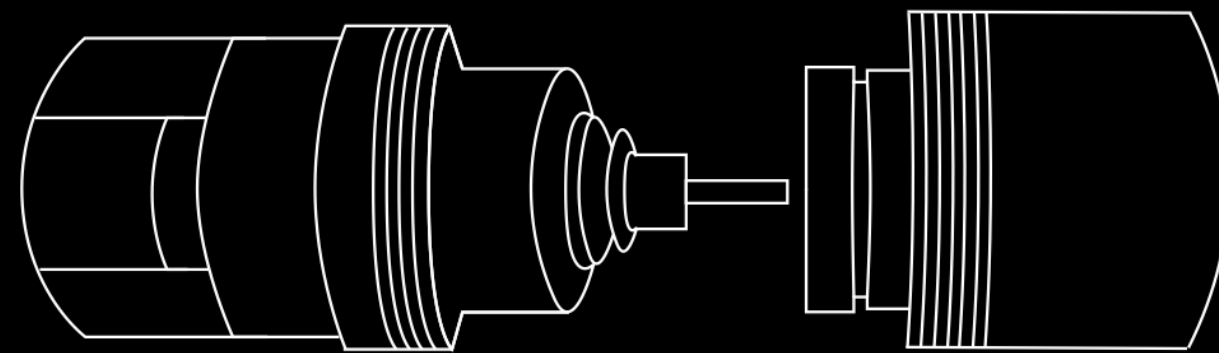


ORFEUS DETECTION SYSTEM IS  
ANALOGOUS TO SENSORS AND  
SAFETY SYSTEM ON AUTOMOBILES





**THROUGH THE USE OF A COAXIAL CABLE,  
ORFEUS ENSURES HIGH-SPEED COMMUNICATION  
BETWEEN THE DRILL AND THE RADAR UNIT  
OVER LONG DISTANCES.**



- Cable with added value: The coaxial cable also provides the complete power supply for the drilling technology directly and safely. The connection is completely automatic.







# THE ORFEUS DEVELOPMENT HAS LED TO THE CREATION OF EXTREMELY USER-FRIENDLY SOFTWARE.

- At the core is a 2D representation providing a constant overview with a clear colour scheme.





1

Job Data

Lennestadt

Firts trial

2

Area unit

cm

3

Safety areas

Red Area

0

64

0 32 64 96 128 160 192 224 256 288 320

Yellow Area

64

192

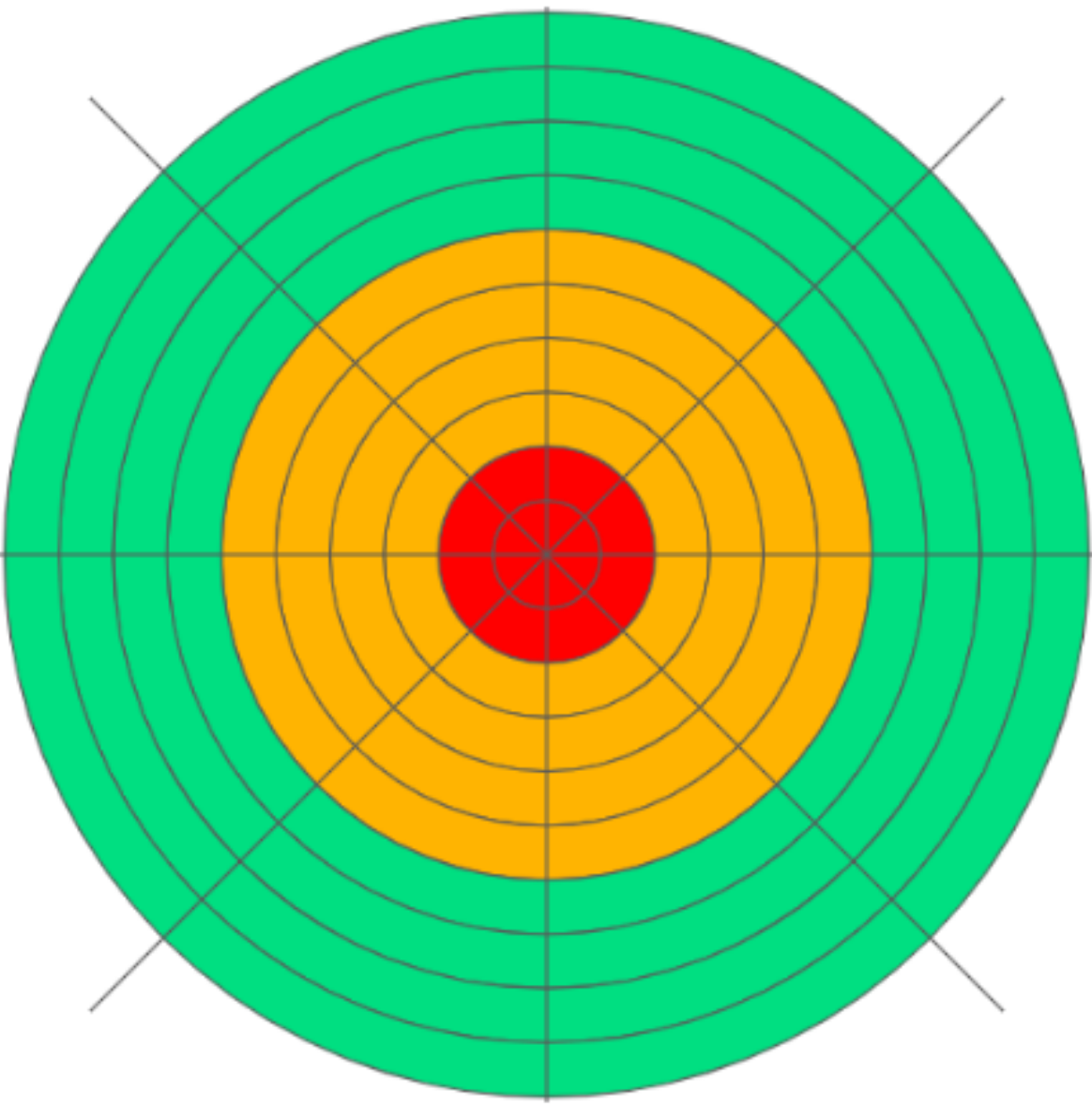
0 32 64 96 128 160 192 224 256 288 320

Green Area

192

320

0 32 64 96 128 160 192 224 256 288 320



4

Approvals

Alarm Release Pin

00 00 00

Repeat Release Pin

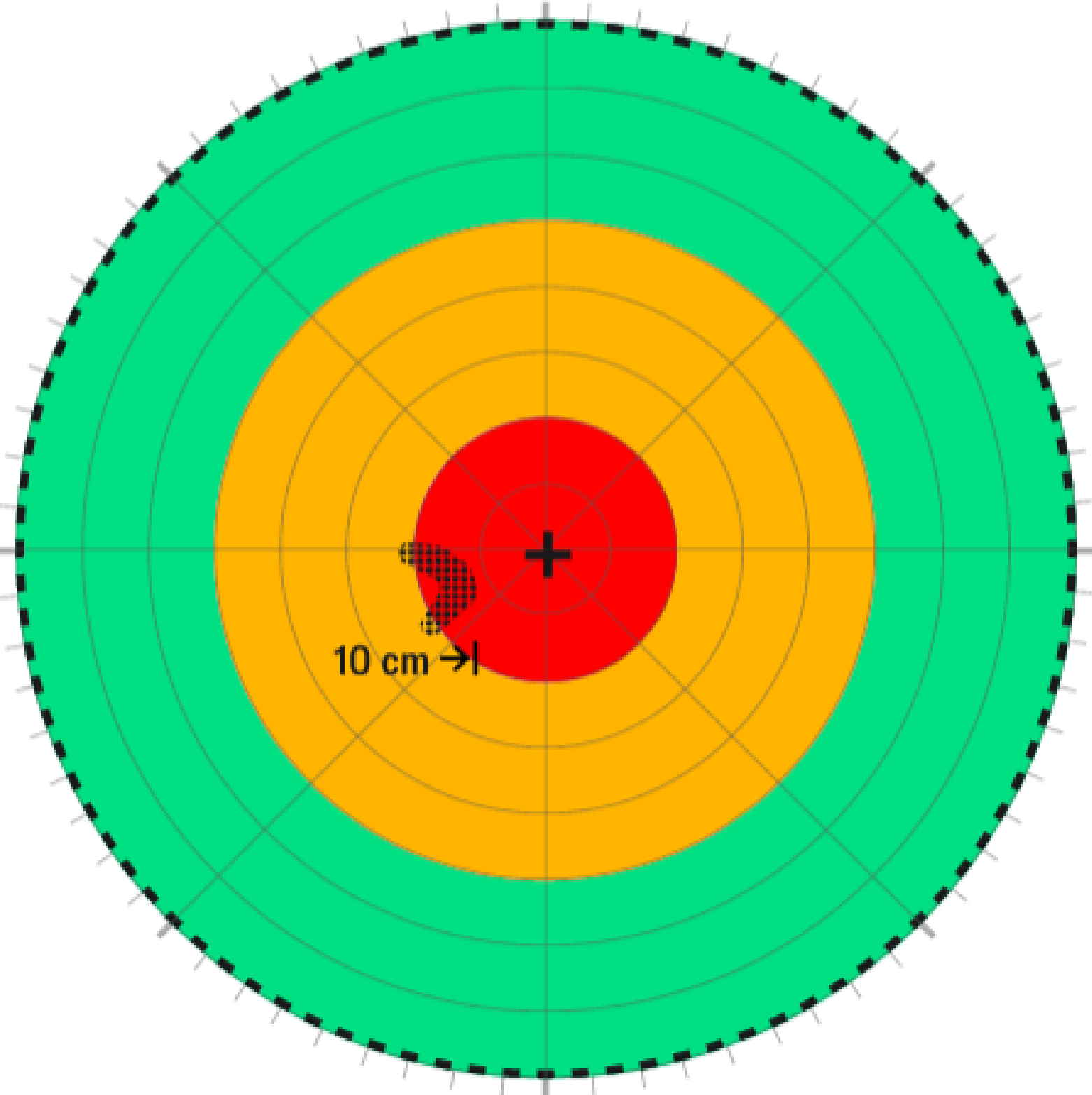
00 00 00



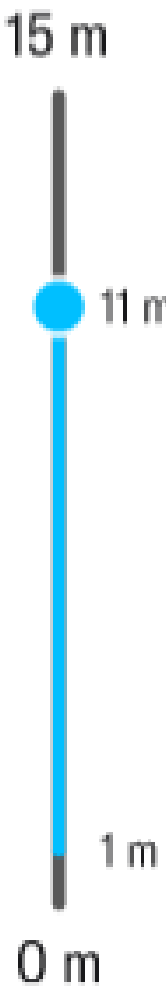


Advanced Radar View

Front View



☐ Show side and top view



Controls

Here you can see the current status

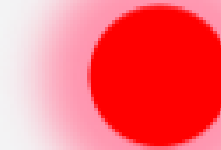
Status

Current Drill Lenght: 11m

Safety area status

An obstacle detected in the red safety area. Please confirm this by entering the pin.

Alarm



Pin Code

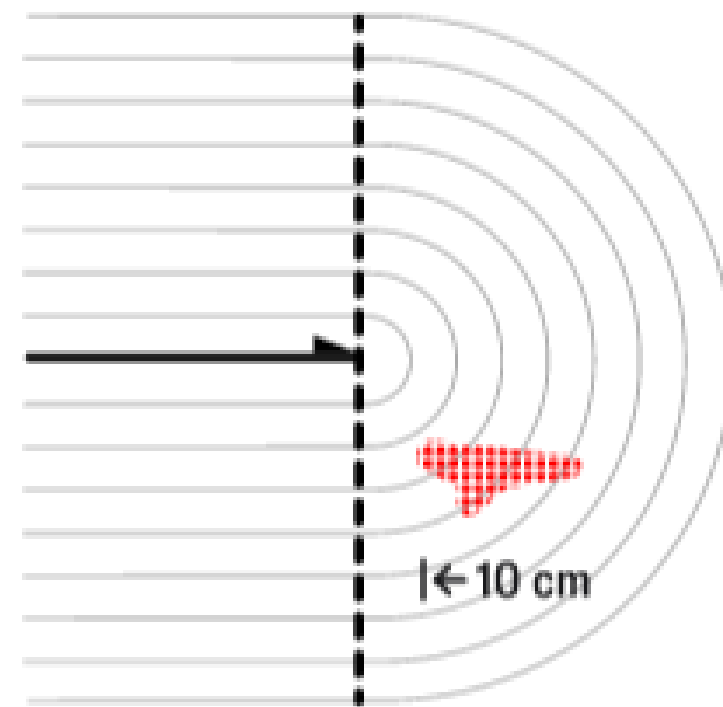
00 00 00

Acknowledge

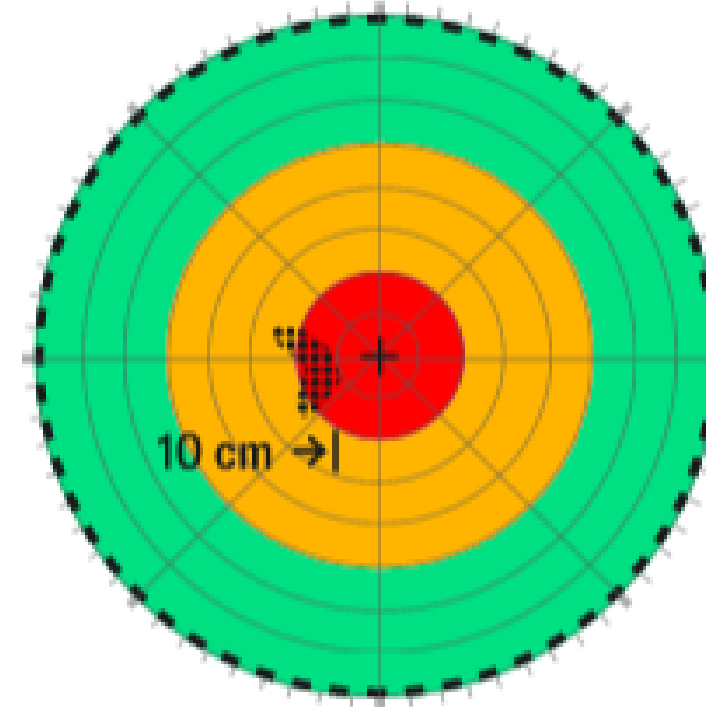


## Advanced Radar View

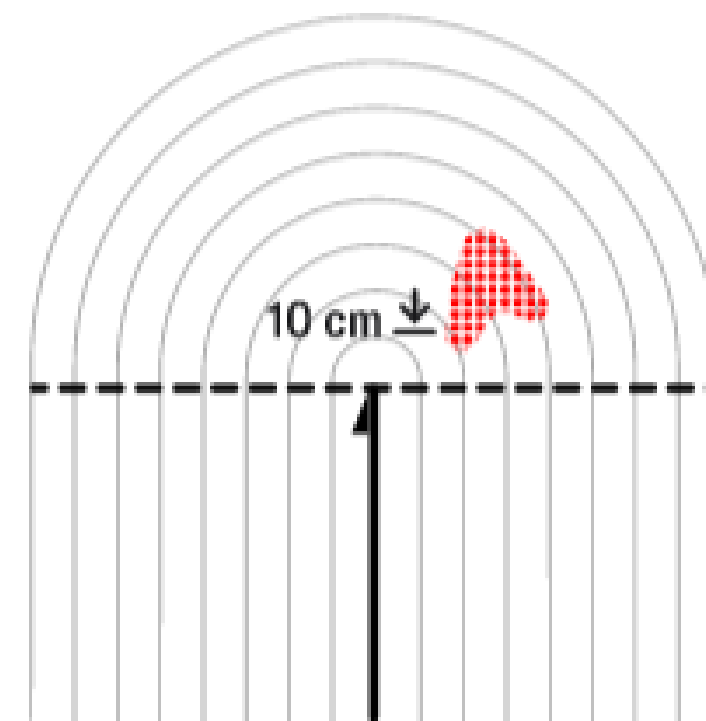
Side View



Front View



Top View

☒ Show side and top view

## Controls

Here you can see the current status

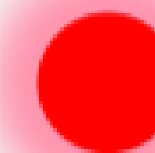
## Status

Current Drill Length: 11m

## Safety area status

An obstacle detected in the red safety area. Please confirm this by entering the pin.

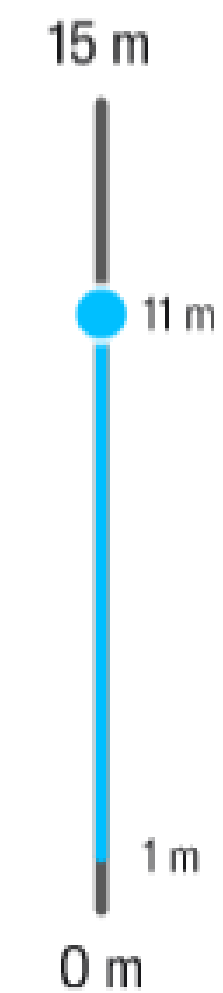
Alarm



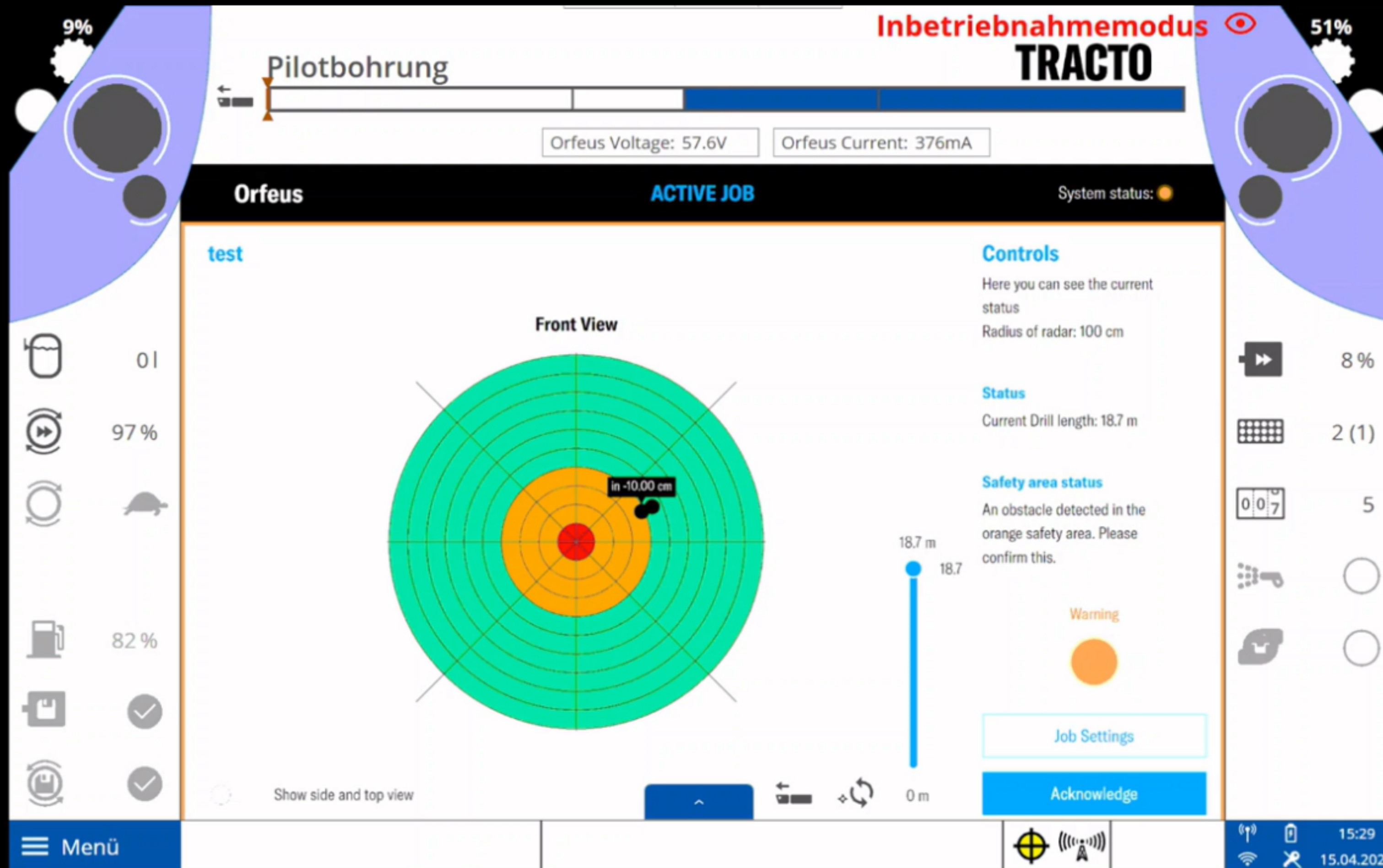
Pin Code

00 00 00

Acknowledge





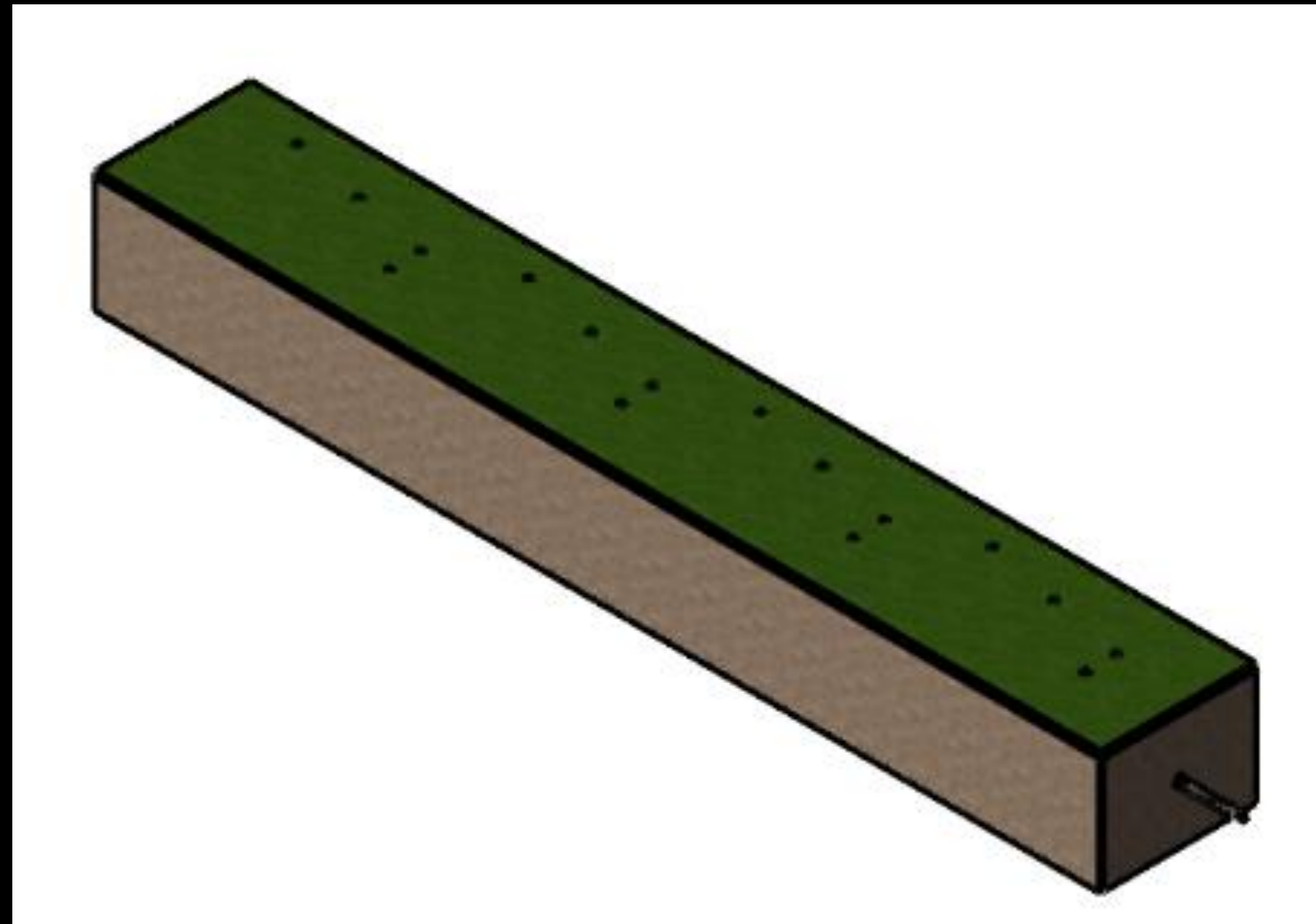
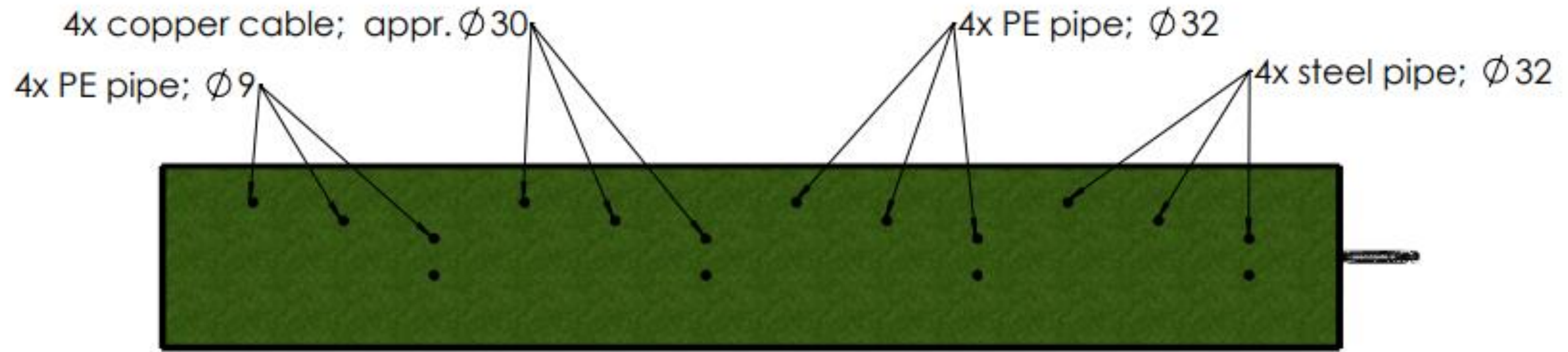




# **FIRST ORFEUS FIELD TESTS**

## **JANUARY 2023**









PE PIPE OD: 9 MM



COPPER CABLE: 32 MM



PE PIPE OD: 32 MM



STEEL PIPE OD: 32 MM

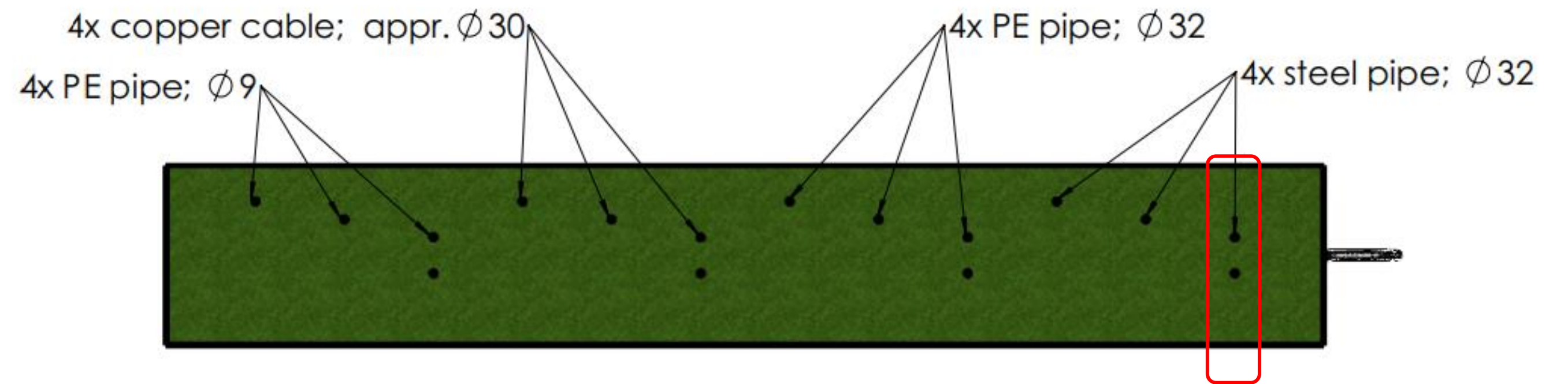
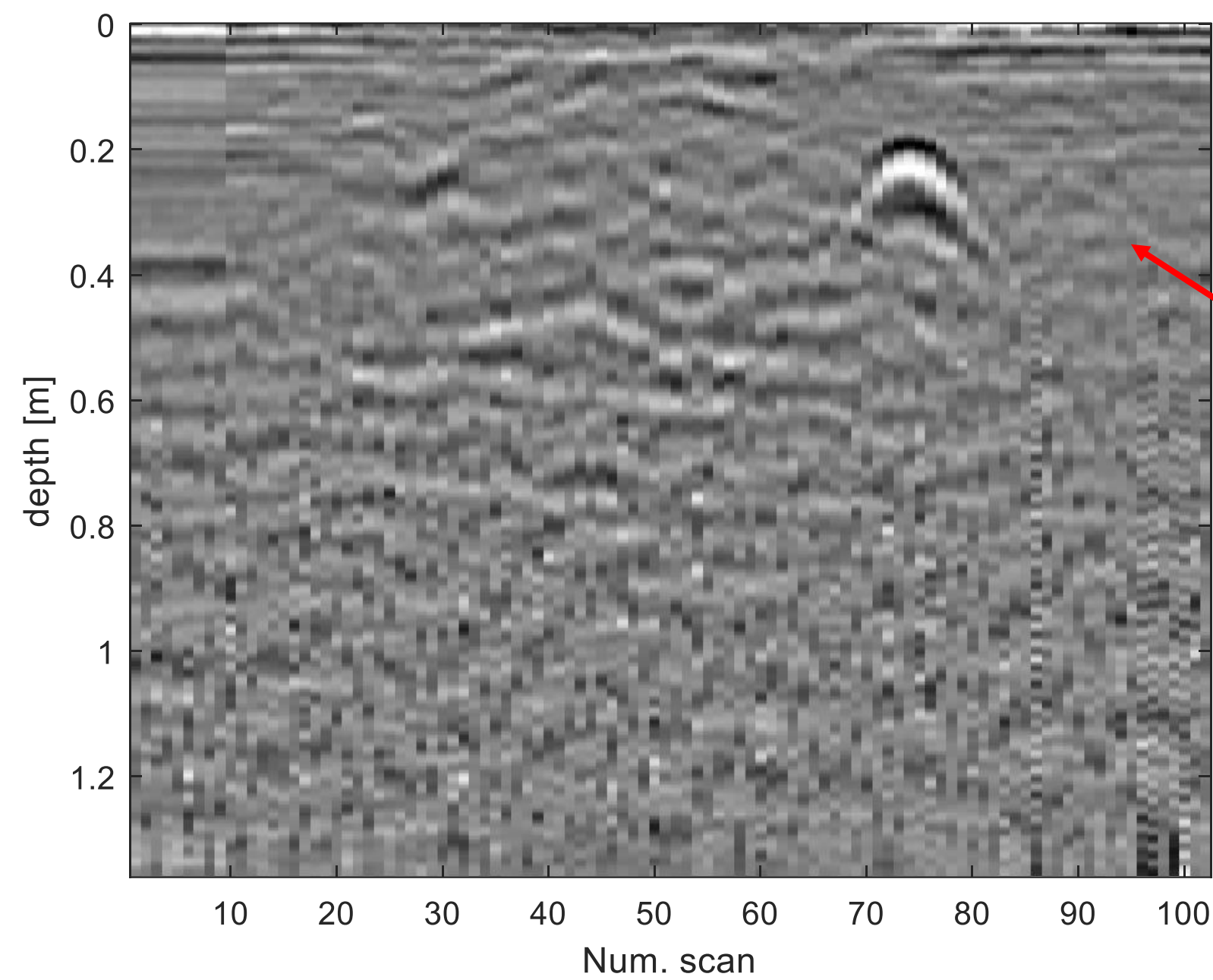




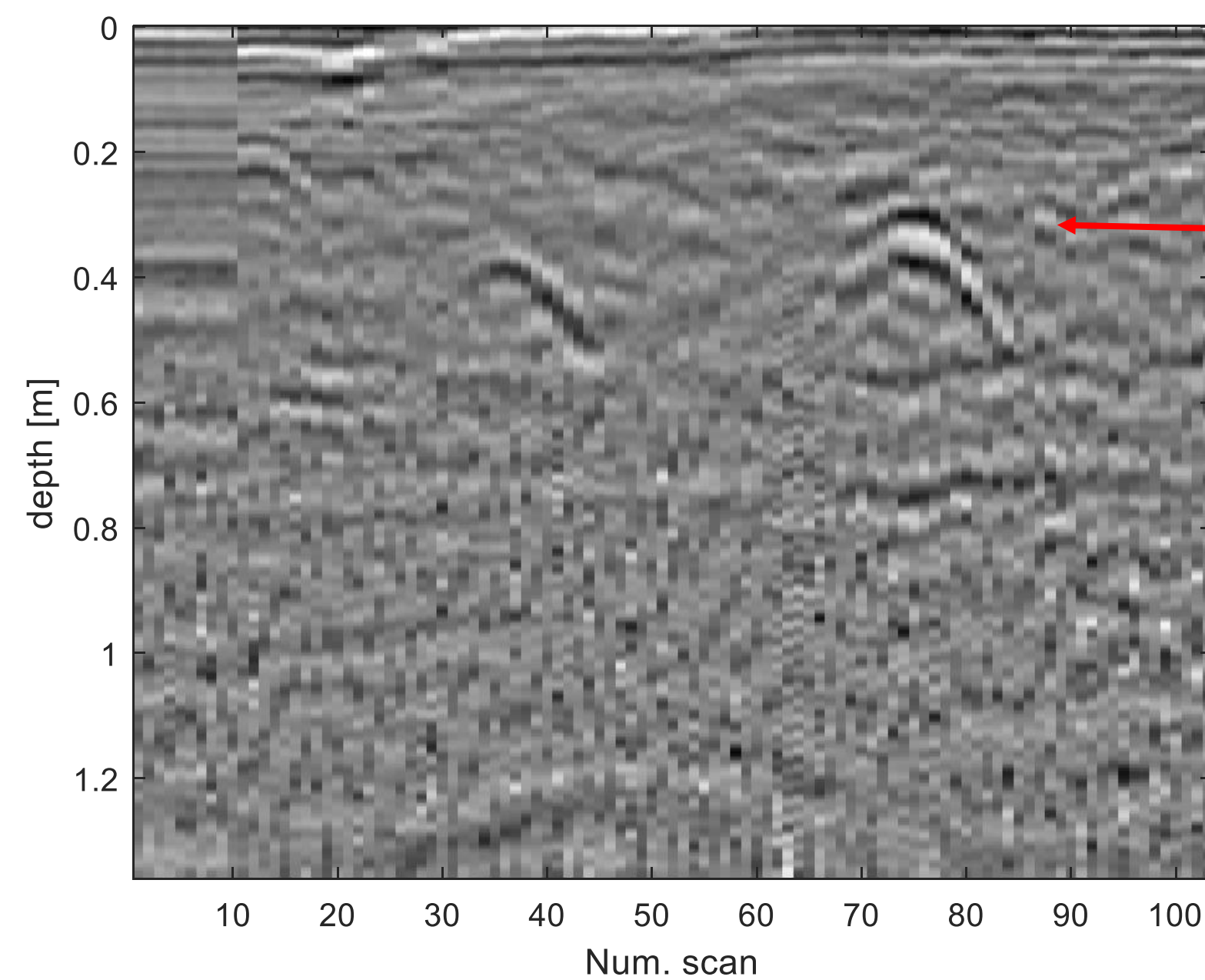




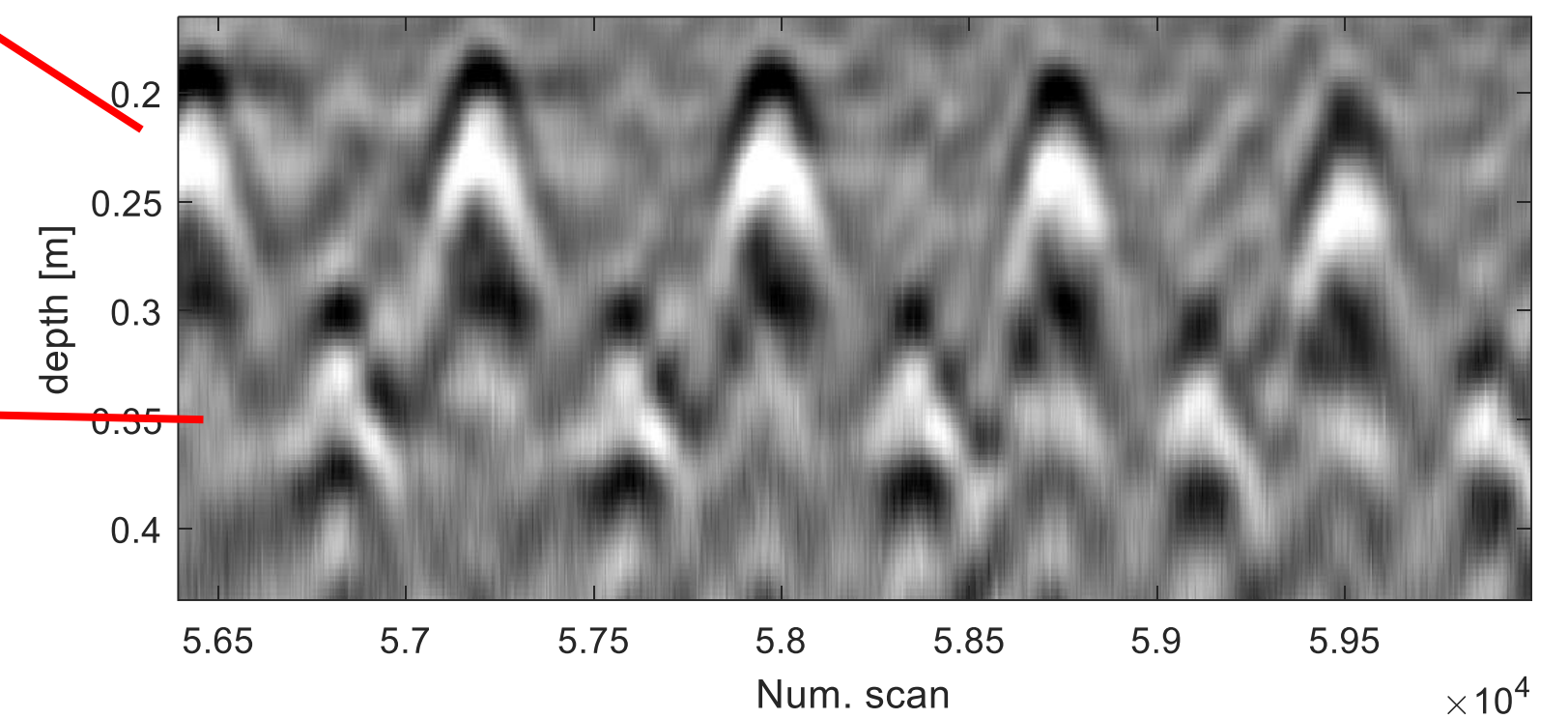




Cut @ 90° right



Cut @ 90° left



360° between hyperbolas (770 scan)  
Two targets with Phase shift 180°

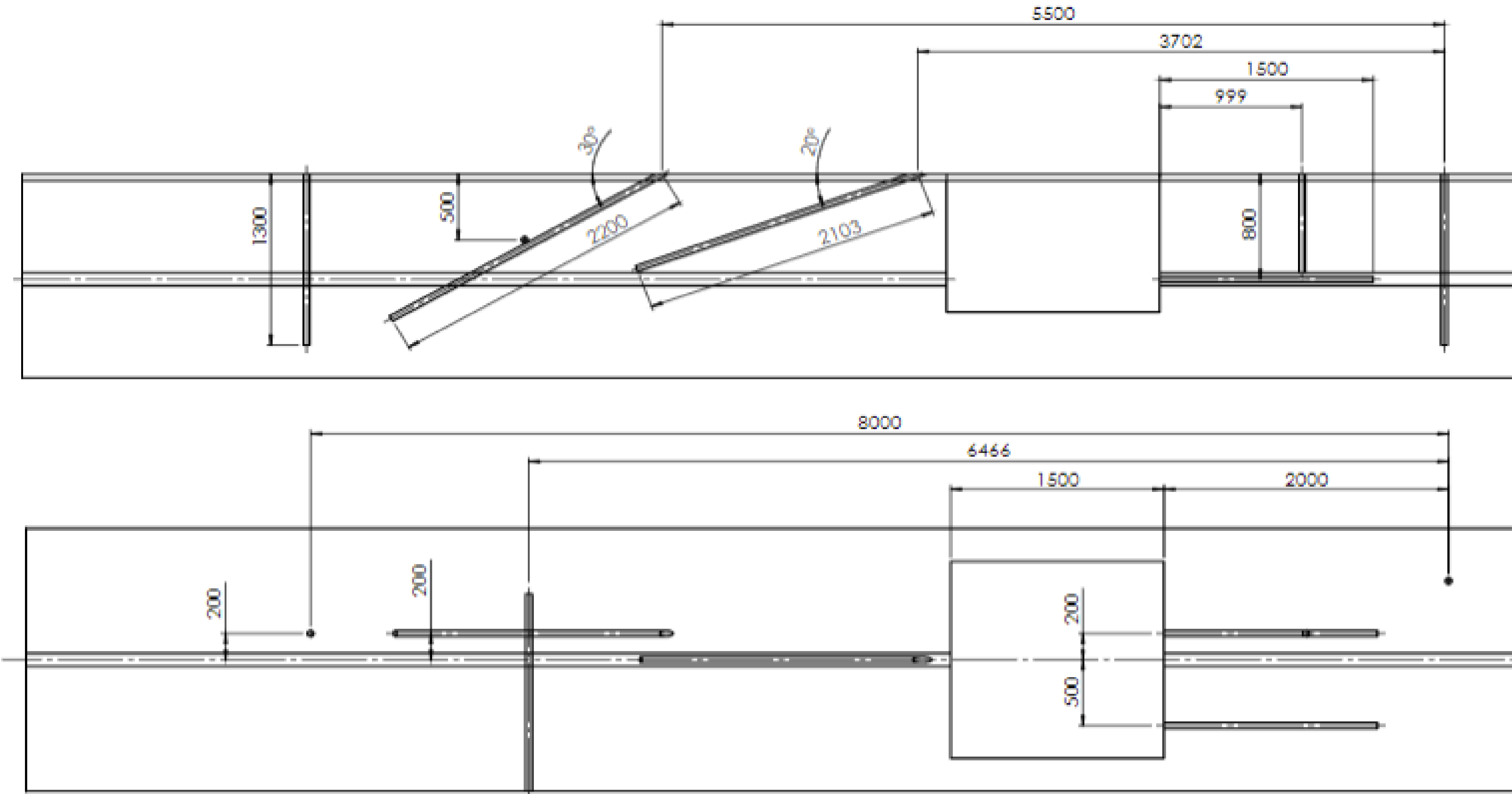


**MARCH 2023 FIELD TESTS**

**ADDITIONAL OBSTACLE  
CONFIGURATION**



# SIDE AND TOP VIEW OF OBSTACLE CONFIGURATION





# STEEL BAR AT THE SURFACE AS REFERENCE





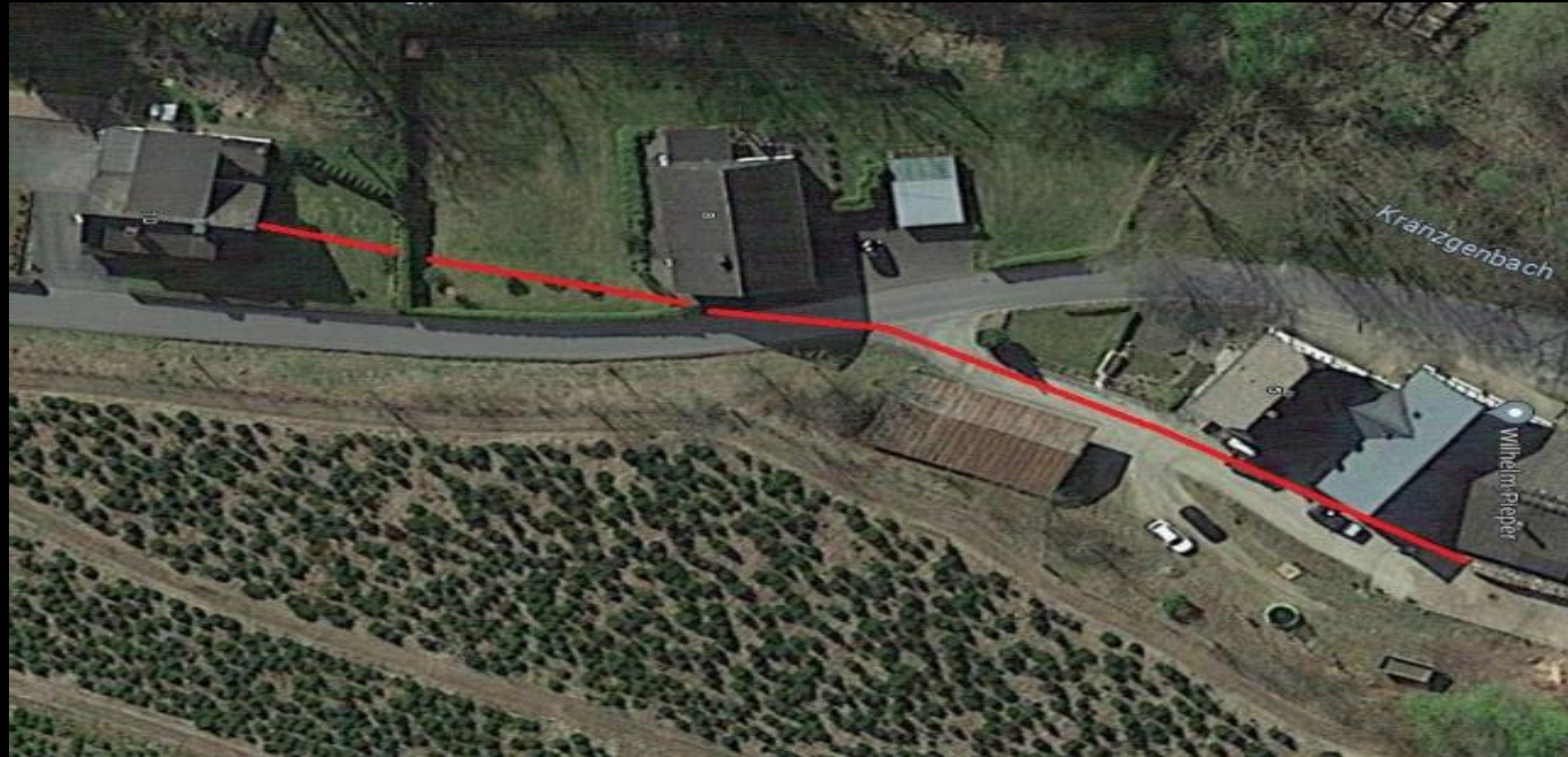




# **MAY 2024 FIELD TESTS**



# ORFEUS FIELD TRIAL (NIEDERLANDENBECK)



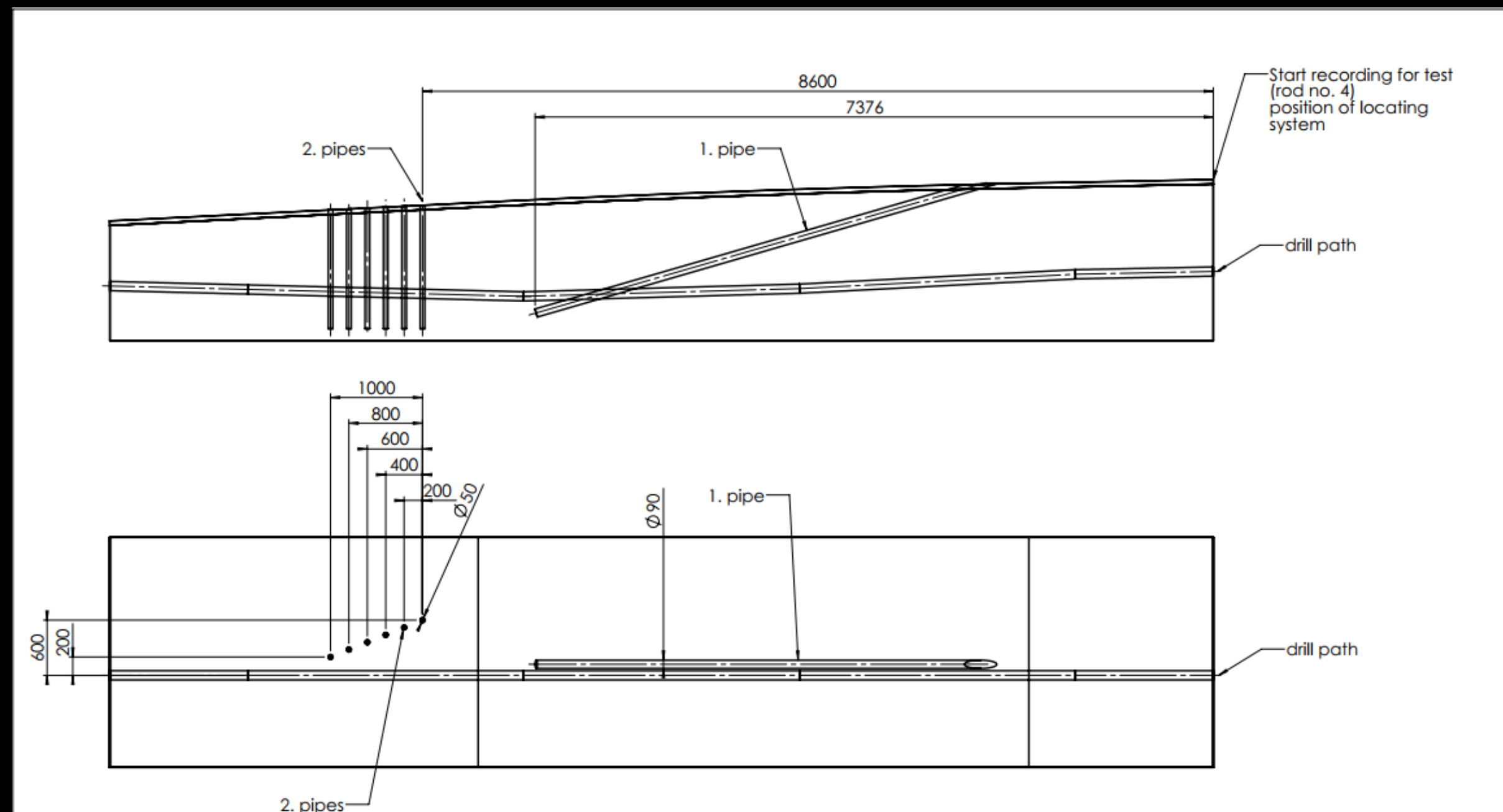


# **JUNE 2024 FIELD TESTS**

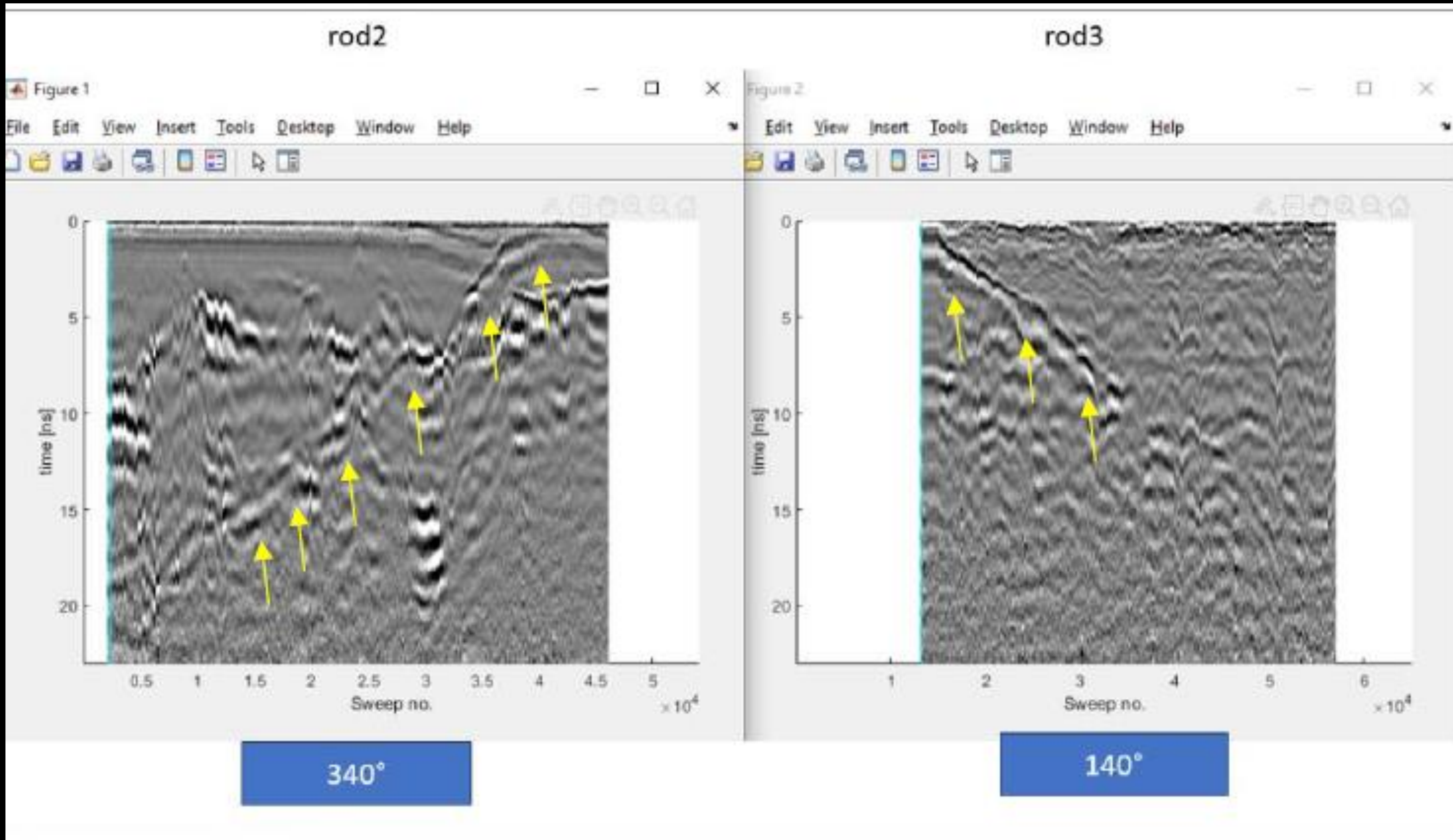


A new arrangement of the test site: pipe laying on the same plane of the drilling path.

More realistic assessment of the detection capabilities of the side unit and reflective of operational situations.







Radargrams where the yellow arrows indicate the reflections by the askew pipe



# ORFEUS Next Steps

- A 2<sup>nd</sup> ORFEUS HDD rig was shipped to the US in April 2024 to conduct field trial with various utility obstacles installed.
  - Planned field demonstration at GTI Energy for the OTD utility members in Oct. 2024
  - Planning additional live demos with US utilities and TT Technologies
- Additional field trials needed to collect further data to optimize the algorithm
  - TRACTO and their partners will continue to work with utility contractors in Europe to identify and demonstrate the ORFEUS system on various utility jobsites.



# ORFEUS Next Steps (continued)

- Goal is to make ORFEUS look ahead technology as an “add on” to various OEM HDD drill rigs.
- Tracto plans to announce ORFEUS technology during an April 2025 Construction Conference (BAUMA)
- Tracto plans to make commercial units available in 2025.



# ORFEUS – Commercialization Efforts

- TRACTO will take further measures to increase awareness of the market to realize sales, such as:
  - On site demonstrations
  - Professional training
  - Application consulting
  - On-site services and support
  - Events to share expertise and exchange know-how
  - General campaigns via all available channels





# Questions / Comments

GTI Energy develops innovative solutions that transform lives, economies, and the environment

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