AWARDS Highways WINNER

2019 CN AWARDS HIGHLY COMMENDED

Macleod Simmonds

Award Winning
Geospatial Excellence

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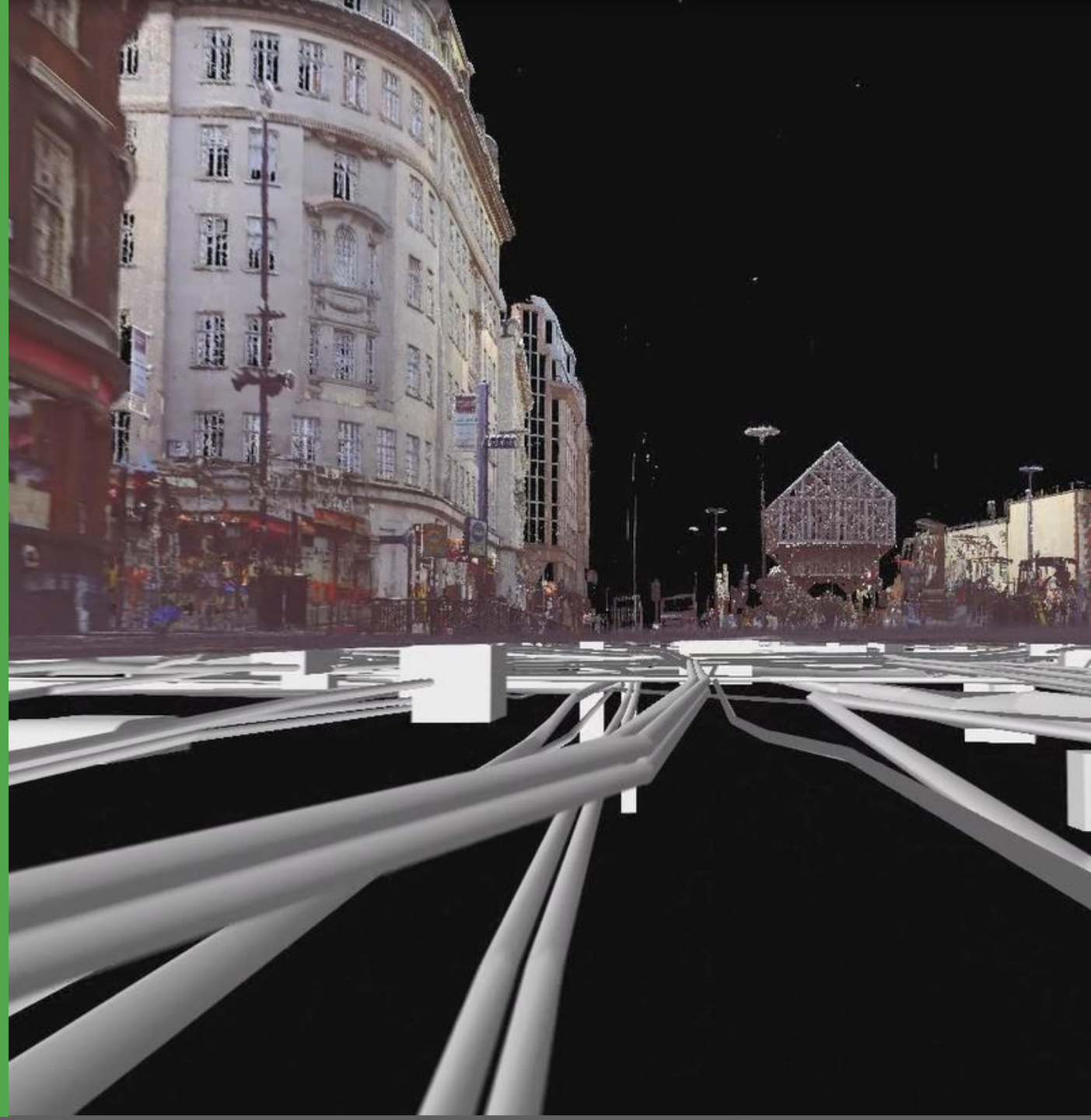
GEOSPATIAL SURVEYS



Macleod Simmonds Limited

- Award winning suppliers of Utility, Topographical & Geophysical Survey data
- Pioneers in the development and application of Ground Probing Radar
- Operating 6 HDAGPR systems (the largest commercial fleet currently worldwide)
- In-House software development team
- Proprietary GPR data processing software ‘GPRCAD’
- Framework Contractor to Transport for London
- Preferred supplier to City of London
- Regular GPR Services Supplier to many top UK Surveying Companies
- Supplier to LoHaC contractors and many local authorities
- Current accreditations and professional memberships: **CHAS**, **Constructionline (Gold)**, **F.O.R.S.**, **ICES**, **The TSA**, **EuroGPR**, **Cyber Essentials**, **Safe Contractor** and **ISO 9001:2015**.

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GEOSPATIAL SURVEYS

PAS128 Utility Survey's

EML Transmitter, Receiver & Trace Cable

Cover Investigations

Total Station Positioning

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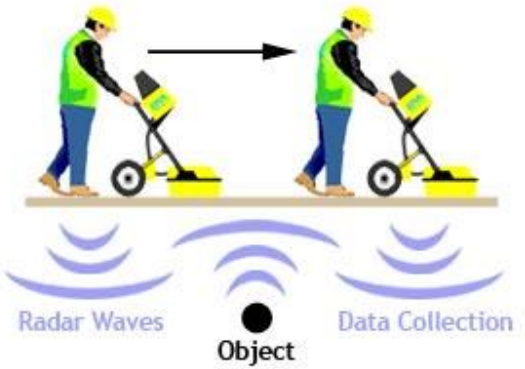
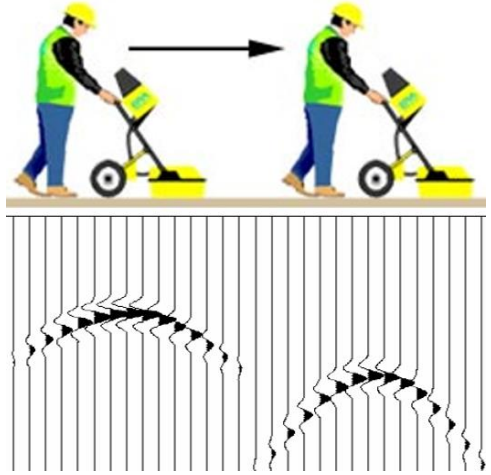
GEOSPATIAL SURVEYS

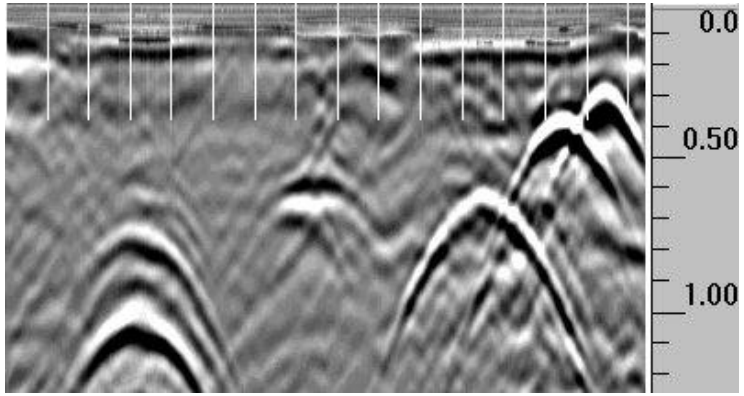
PAS128 Utility Survey's



Concept



Conventional GPR 'radargram'



GPR will detect the presence of "Differences" beneath the ground

- These "Differences" include:
  - Pipes and Cables (plastic as well as metallic)
  - Buried structures
  - Features such as voids
  - Tree roots
  - Changes in construction type/material
  - Variations in ground compaction/density
  - Detection of targets up to 45 degrees to direction of travel

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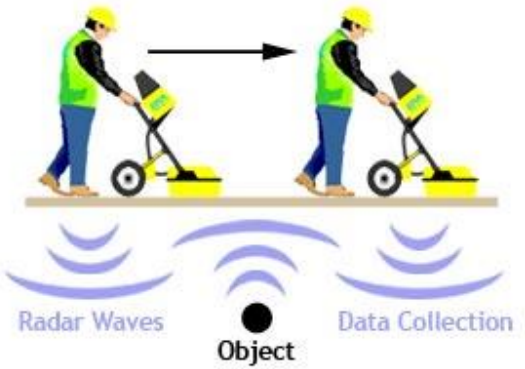
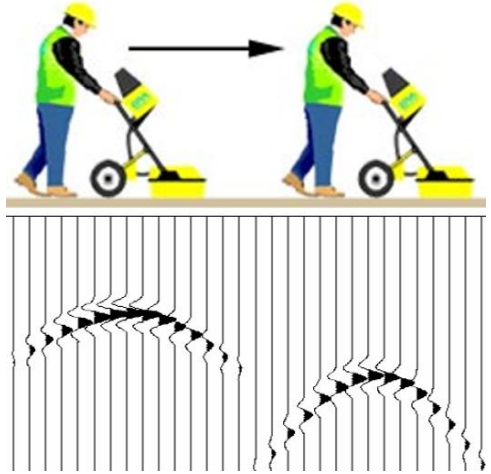
GEOSPATIAL SURVEYS

PAS128 Utility Survey's



Concept



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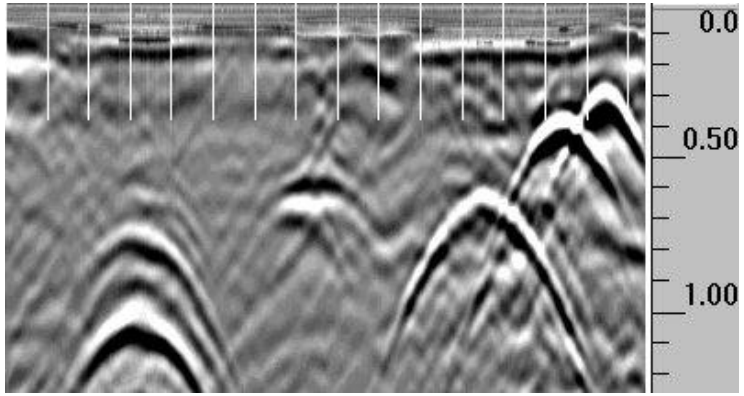

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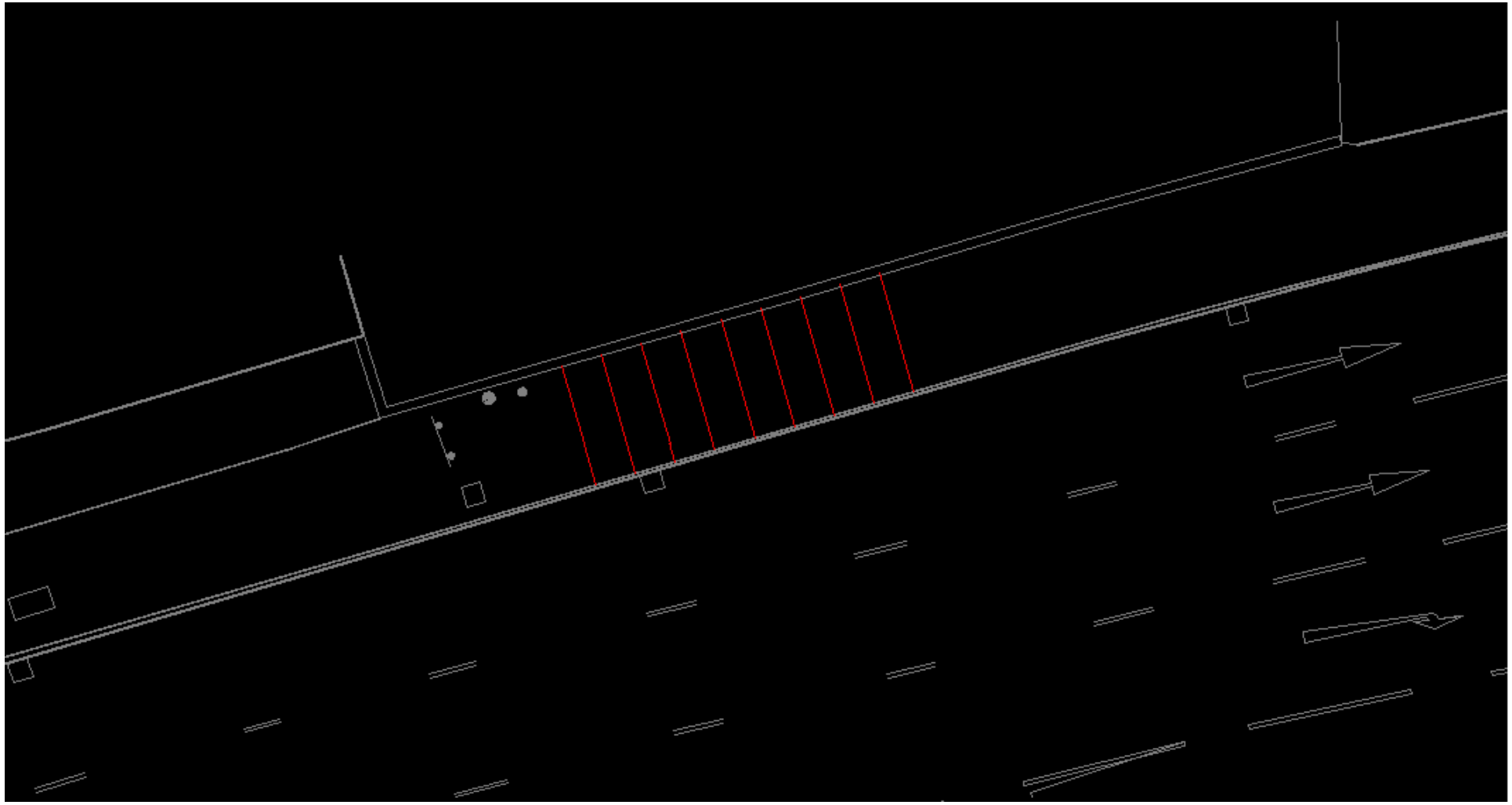
Ground Probing Radar Grids



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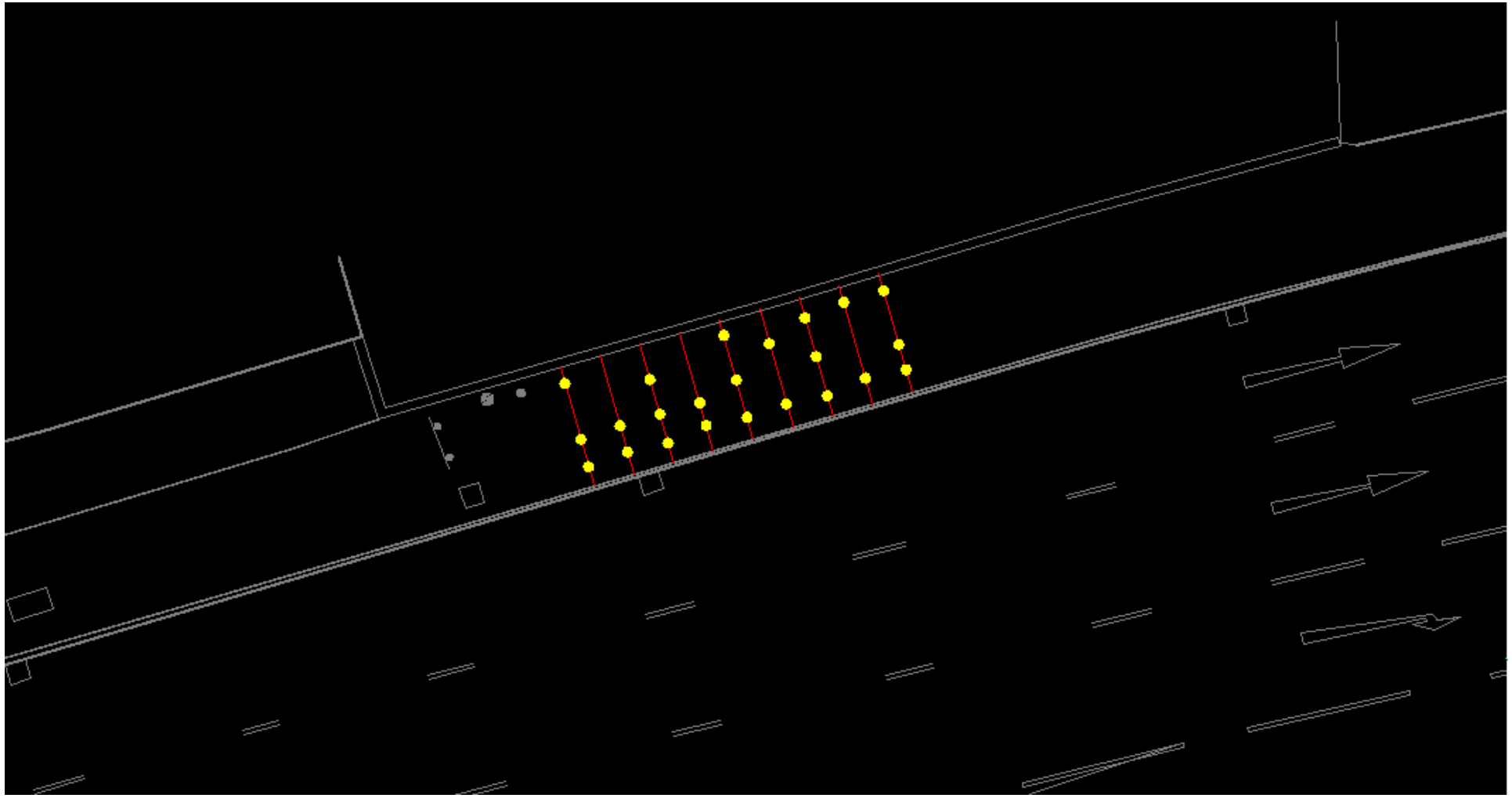
Ground Probing Radar Grids



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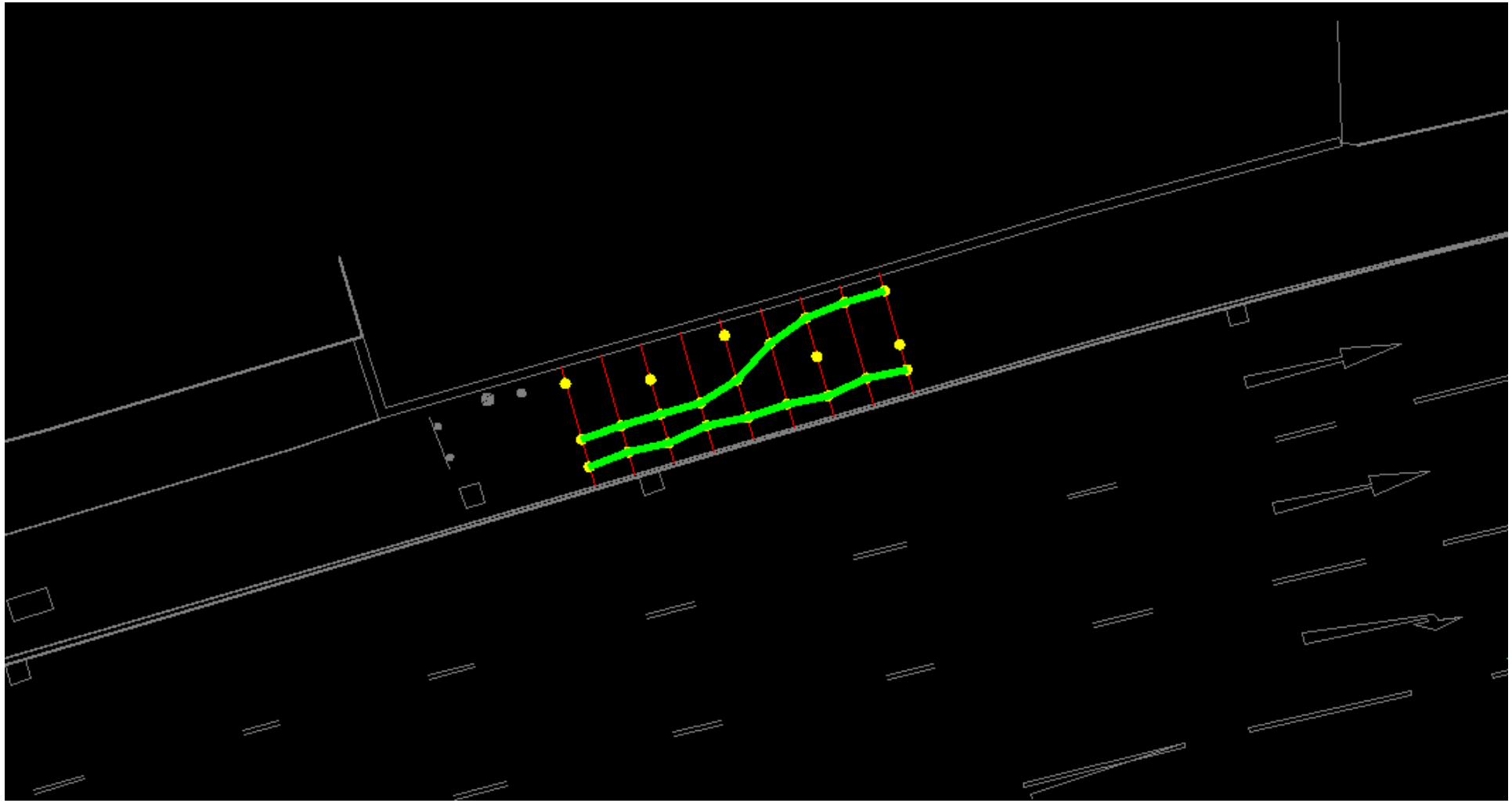
Ground Probing Radar Grids



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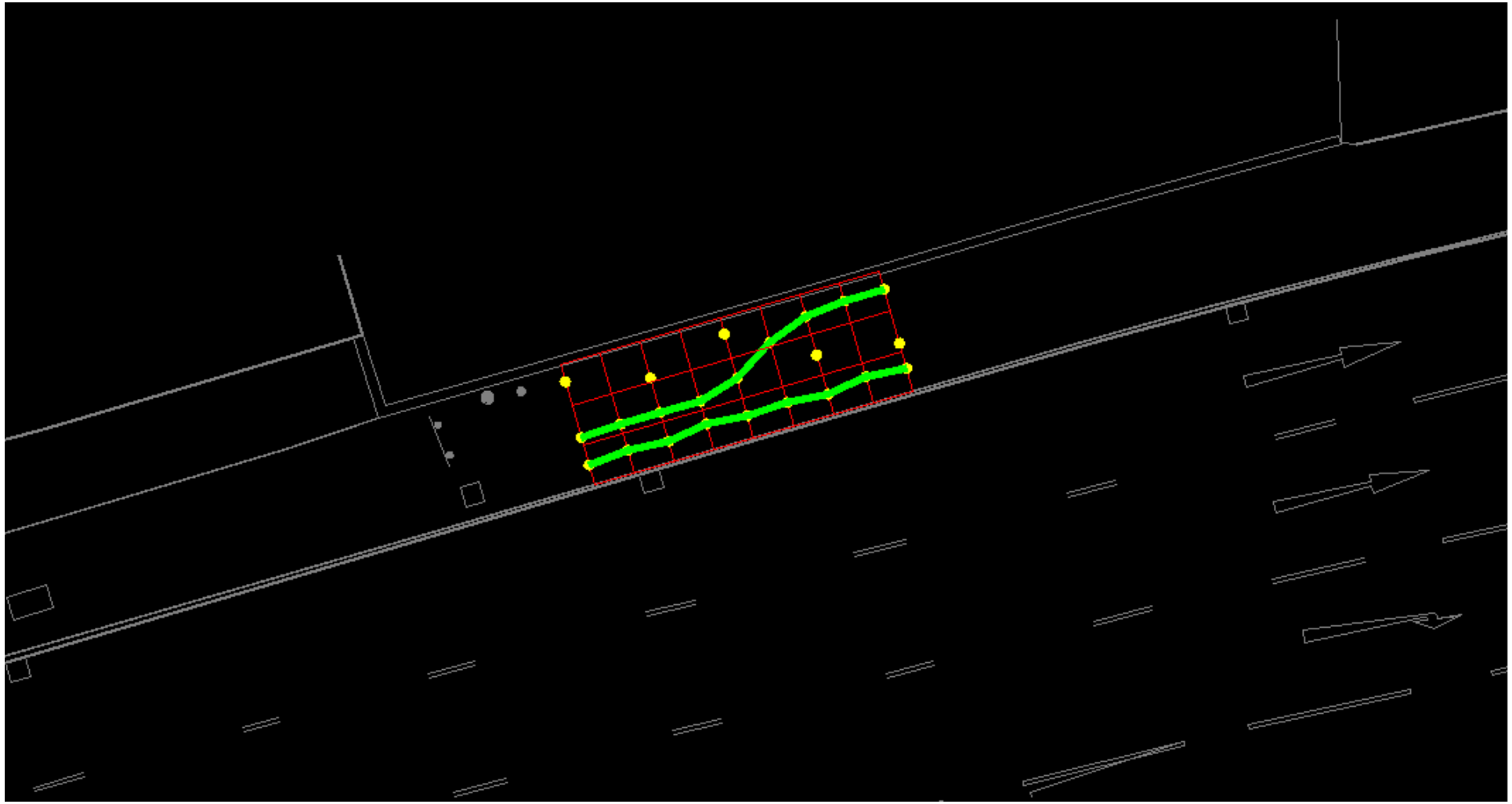
Ground Probing Radar Grids



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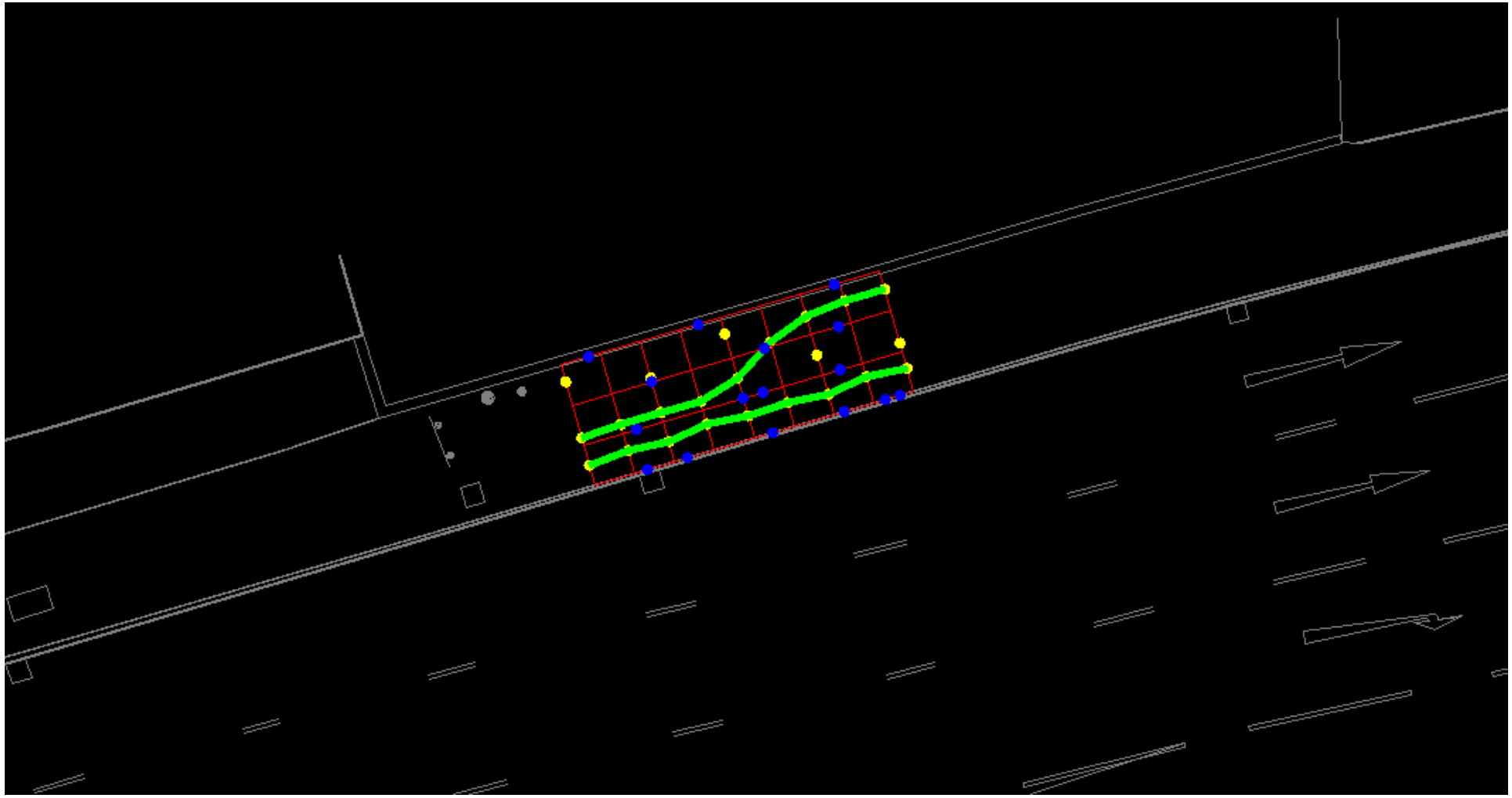
Ground Probing Radar Grids



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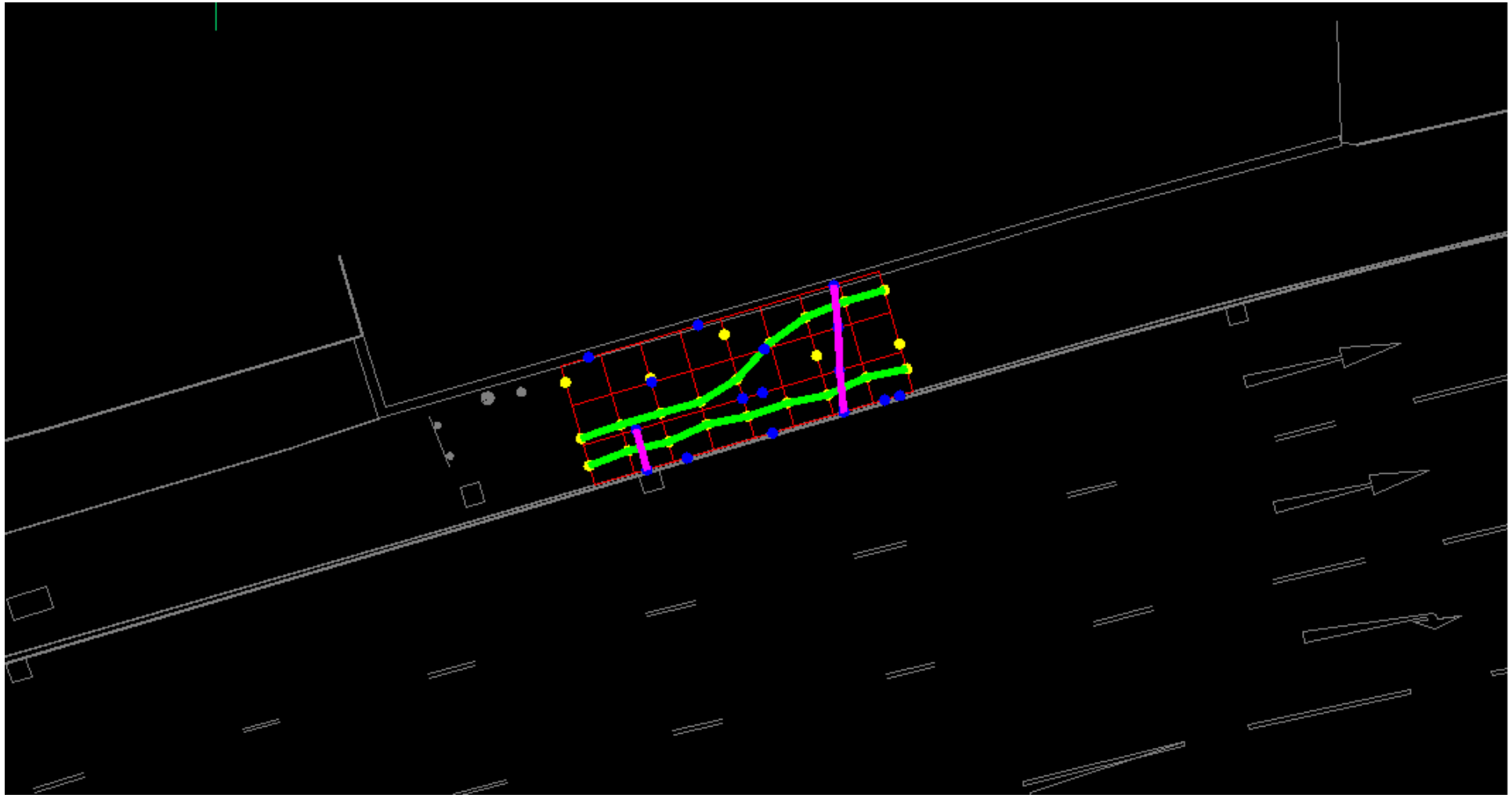
Ground Probing Radar Grids



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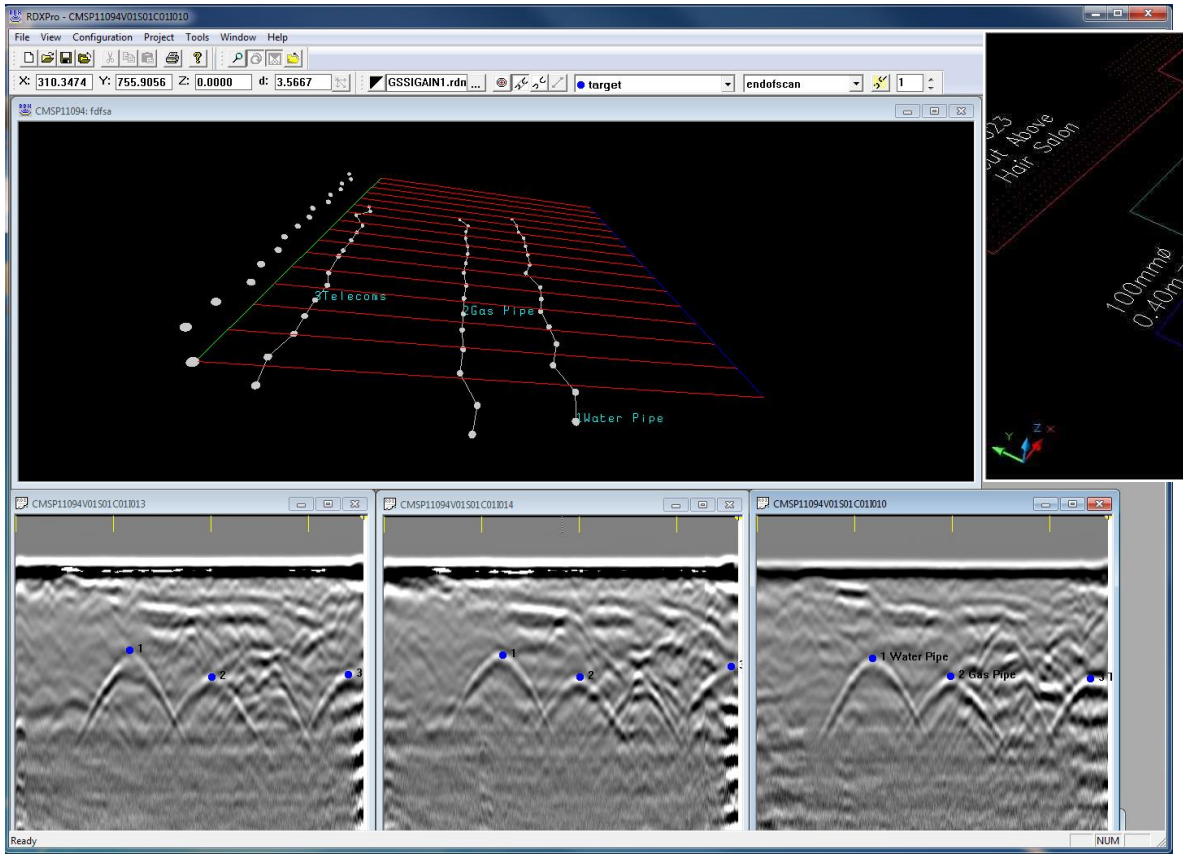
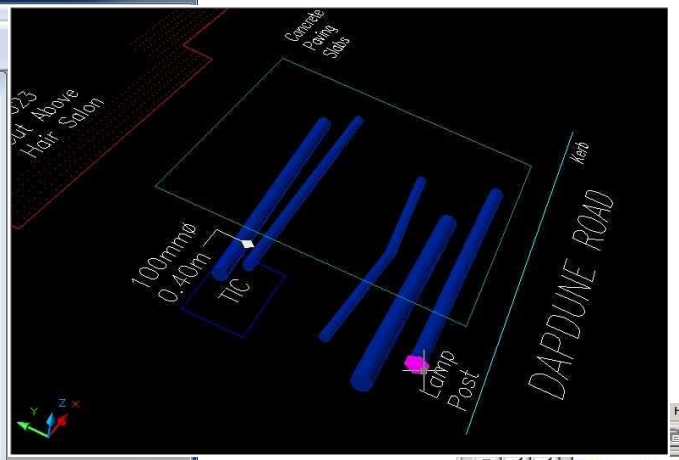
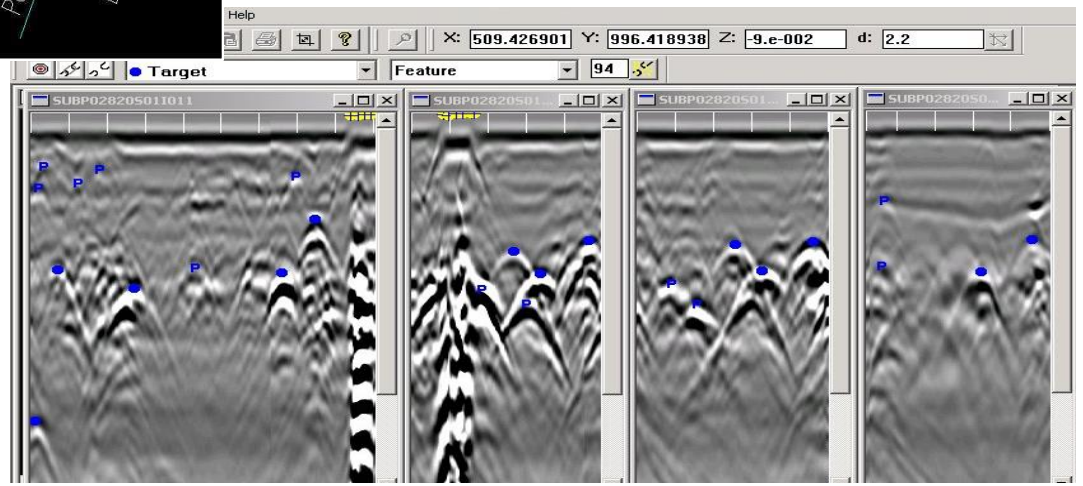
Ground Probing Radar Post Processing







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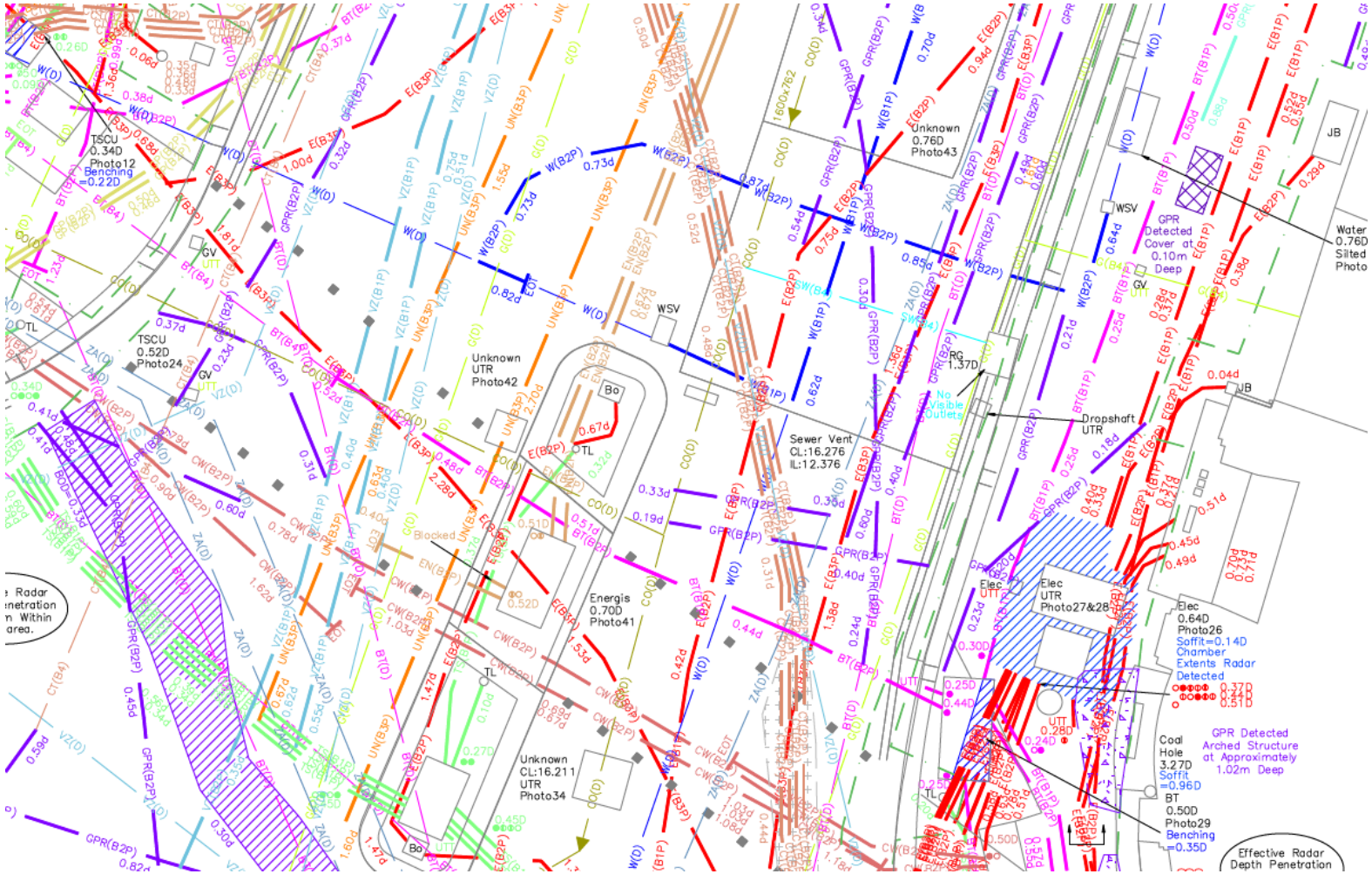
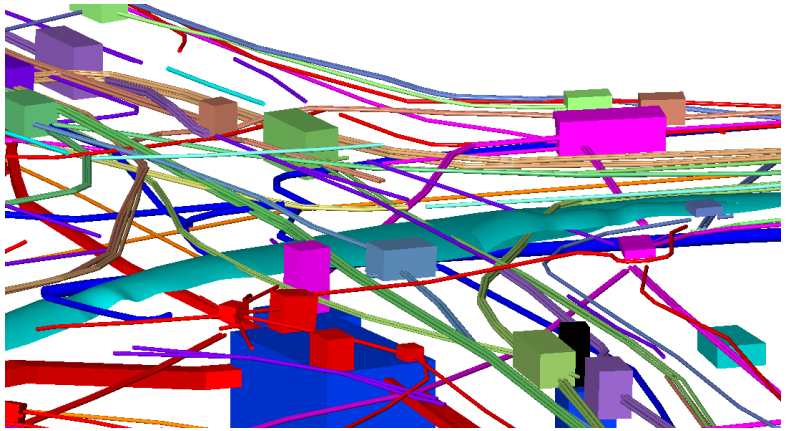
Combining and Completing in CAD





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GEOSPATIAL SURVEYS

Accepted Practice

This approach was developed in 1999 but is still the accepted practice for most utility surveying companies.

Although this methodology produces accurate and reliable results, it is slow and requires a great deal of manual input:

- To scan road ways, traffic management is required including lane closures
- A visual “Grid” needs to be marked on site using paint
- The scan positions need to be manually positioned using a Total Station
- This method still relies on the analyst connecting the correct target detections through analysis of individual profiles

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GEOSPATIAL SURVEYS

High Density Array GPR

Objectives:

- Only scan in a single direction
- Doesn't require traffic management
- No Man access needed in carriageway
- No paint required to mark grids
- Capture enough information to "Image" the subsurface rather than rely on radar profile analysis

The concept was born, but the hardware was too slow and not effective

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GEOSPATIAL SURVEYS

Array GPR

Having learned from the Terra Vision, we approached a manufacturer who agreed to build us a prototype 40 channel GPR system, to our specification:

Objectives:

- Only scan in a single direction
- Doesn't require traffic management
- No Man access needed in carriageway
- No paint required to mark grids
- Capture enough information to "Image" the subsurface rather than rely on radar profile analysis

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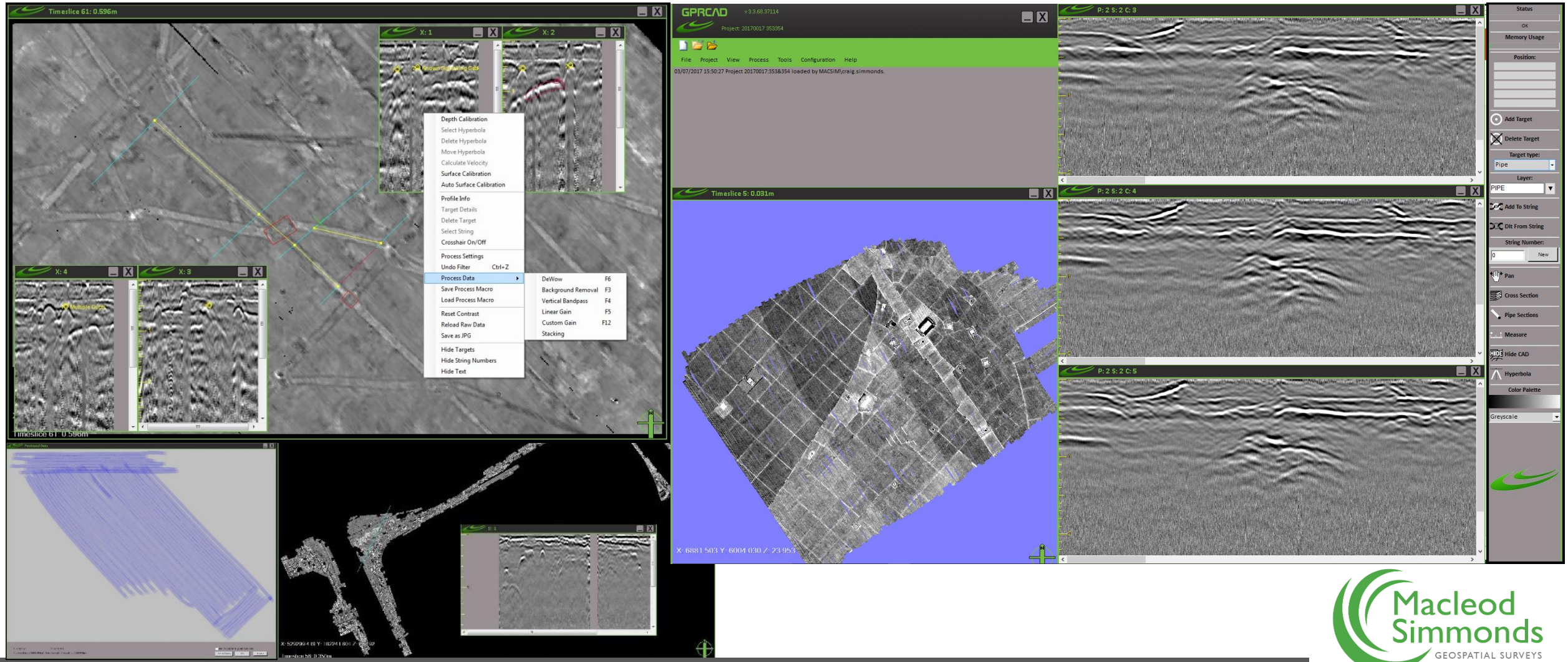
GEOSPATIAL SURVEYS

GPRCAD Software



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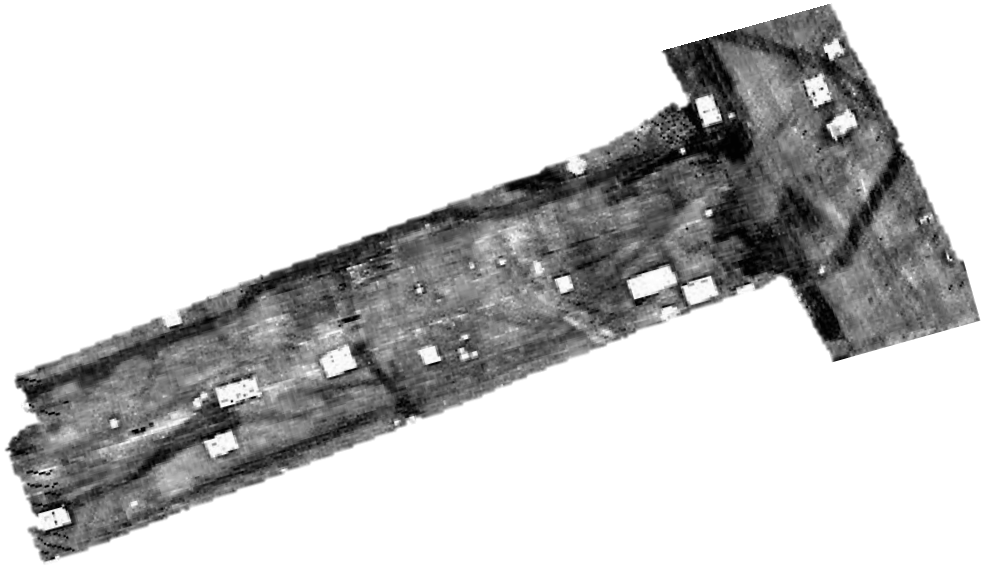
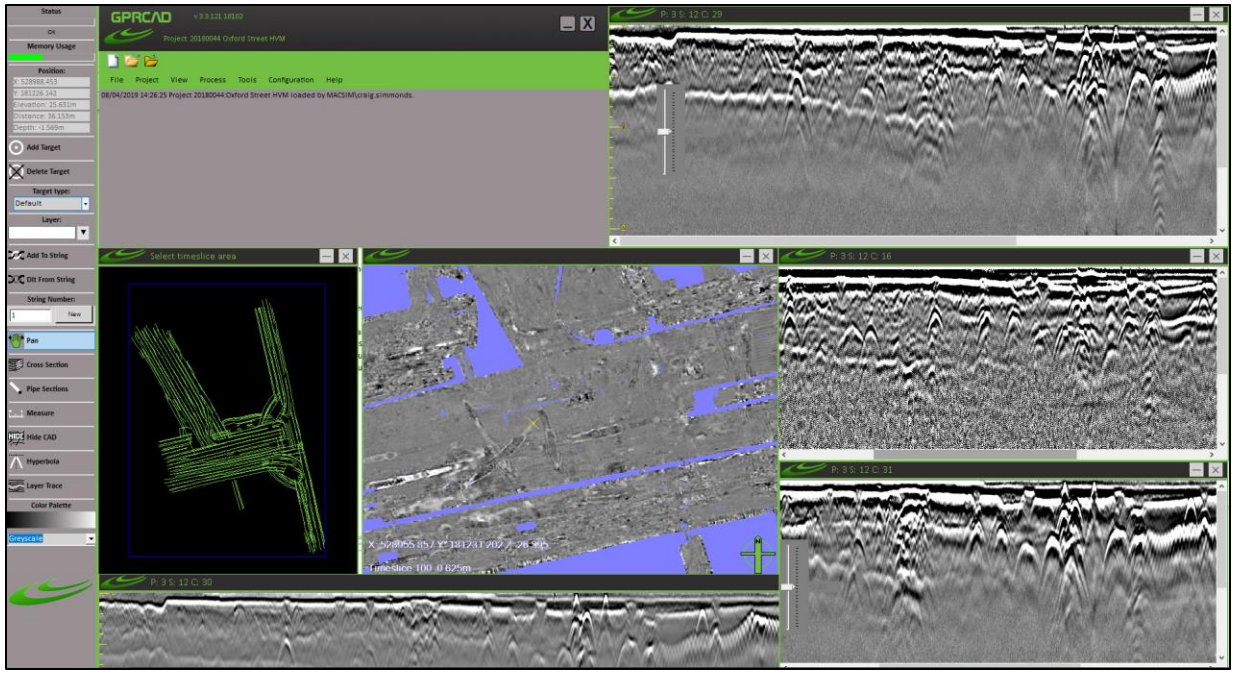
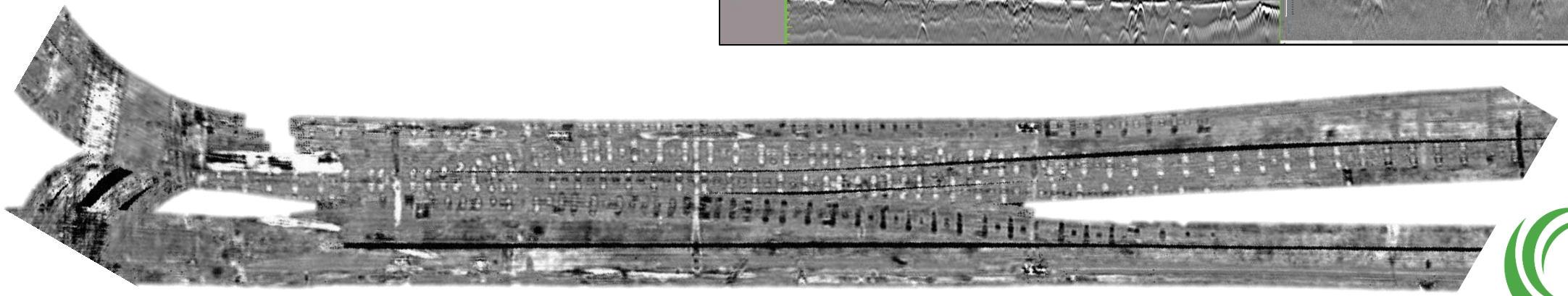
HIGHWAY MAINTENANCE
KX66 XVH

Images created from the Array Data







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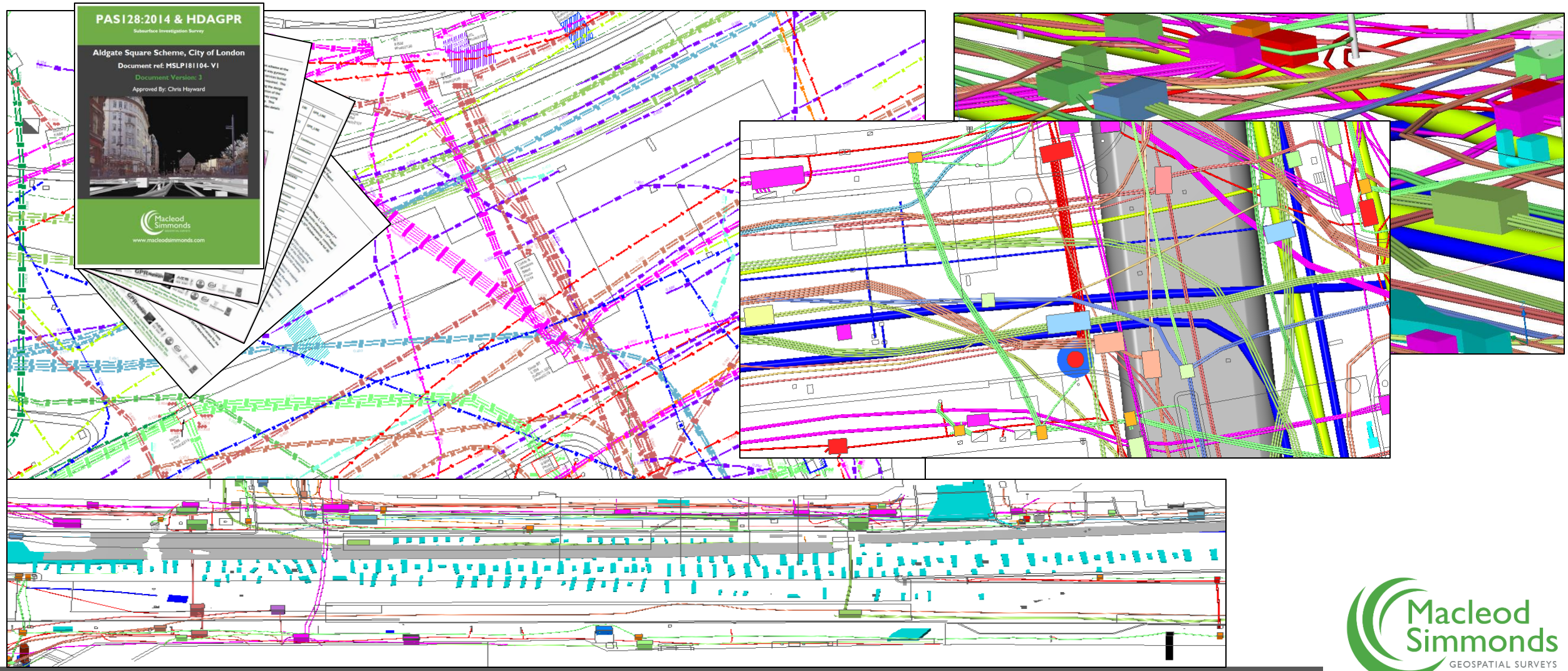
Accurate Reliable Data



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GEOSPATIAL SURVEYS

Aldgate Gyratory

Issue:

User groups felt the area was unsafe, dominated by a four-lane carriageway based on 60's traffic planning with numerous barriers to pedestrian movement.

Objective:

Improve the public realm, support regeneration and make the space more attractive to promote further development and investment.

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GEOSPATIAL SURVEYS

Aldgate Gyratory

Requirement:

Rationalise carriageway into two way single lanes with improved space for cyclists and pedestrians. Create a useable public space, add greenery and remove the subway together with the one way system.

Barriers to scheme:

Initial investigation determined 11 utility companies would be affected and the disruption to local businesses and commuters created opposition – Budgets were being tested with one utility company estimating £1.5m for their plant works alone.

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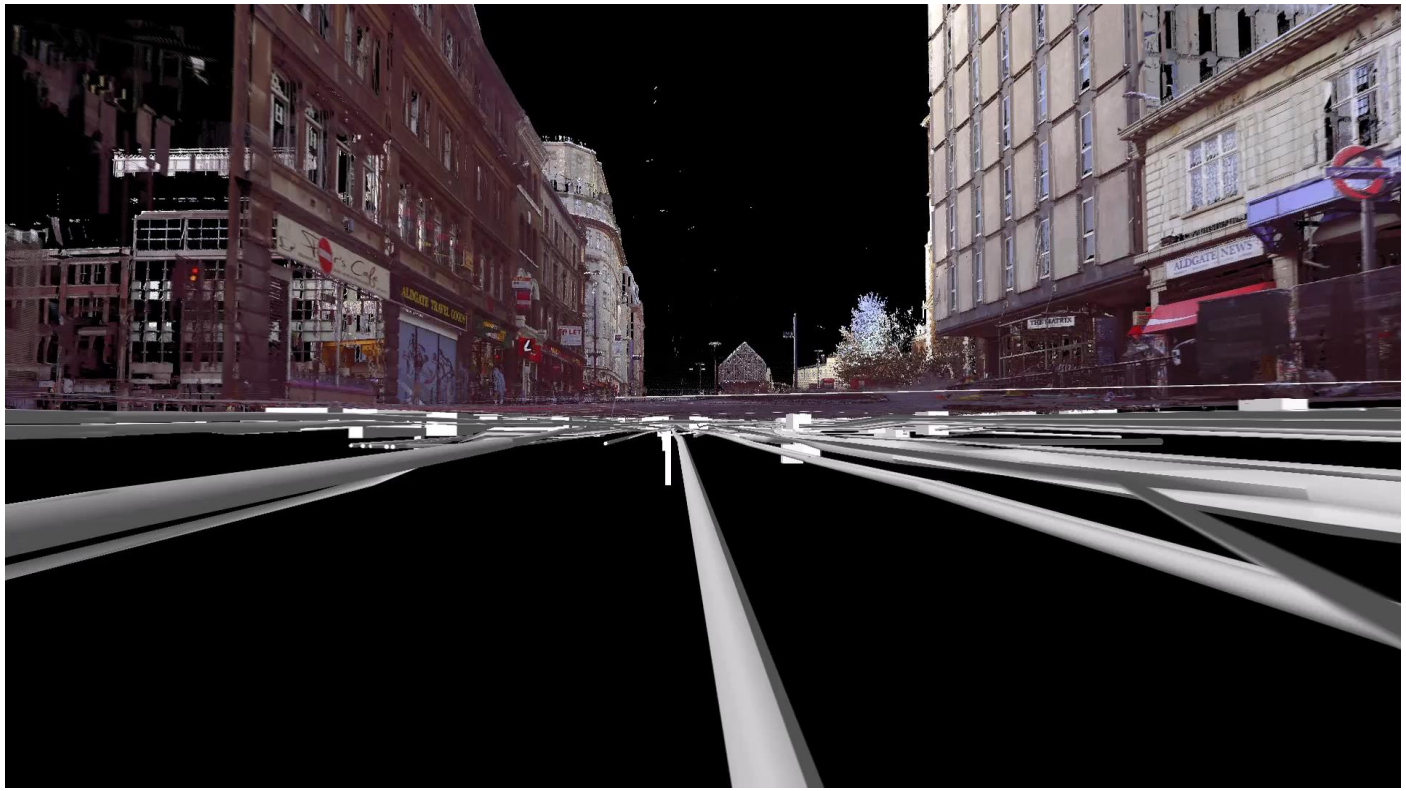
GEOSPATIAL SURVEYS

Aldgate Gyratory

Macleod Simmonds:

Map all detectable utilities and buried structures within the area. Minimise disruption to traffic and pedestrians during survey works. Supply a full PAS128:2014 utility survey, with detailed inspection cover and pit schedule, buried features, object and structure survey and a 3D above/below ground visualisation to promote stakeholder engagement.



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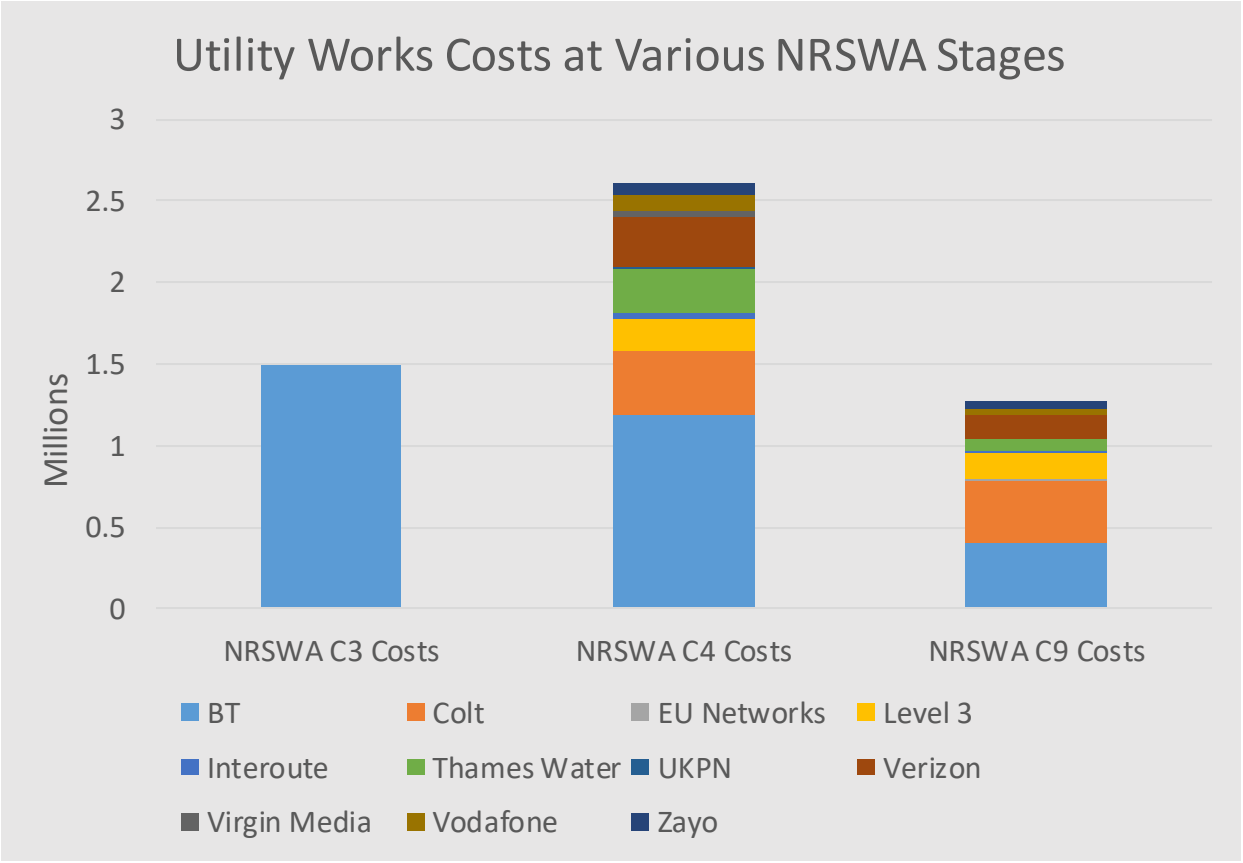
GEOSPATIAL SURVEYS

Aldgate Gyratory

City of London Corporation:

Initially used the survey data to minimise required diversions. The final savings on this part of the scheme, through using the supplied data was in the region of £1.3m.



- NRSWA C3 Stage - £1.5m
  (Works Costs for 1 Company)
- NRSWA C4 Stage - £2.5m
  (Works Costs for 11 Companies)
- NRSWA C9 Stage - £1.2m
  (Works Costs for 11 Companies)

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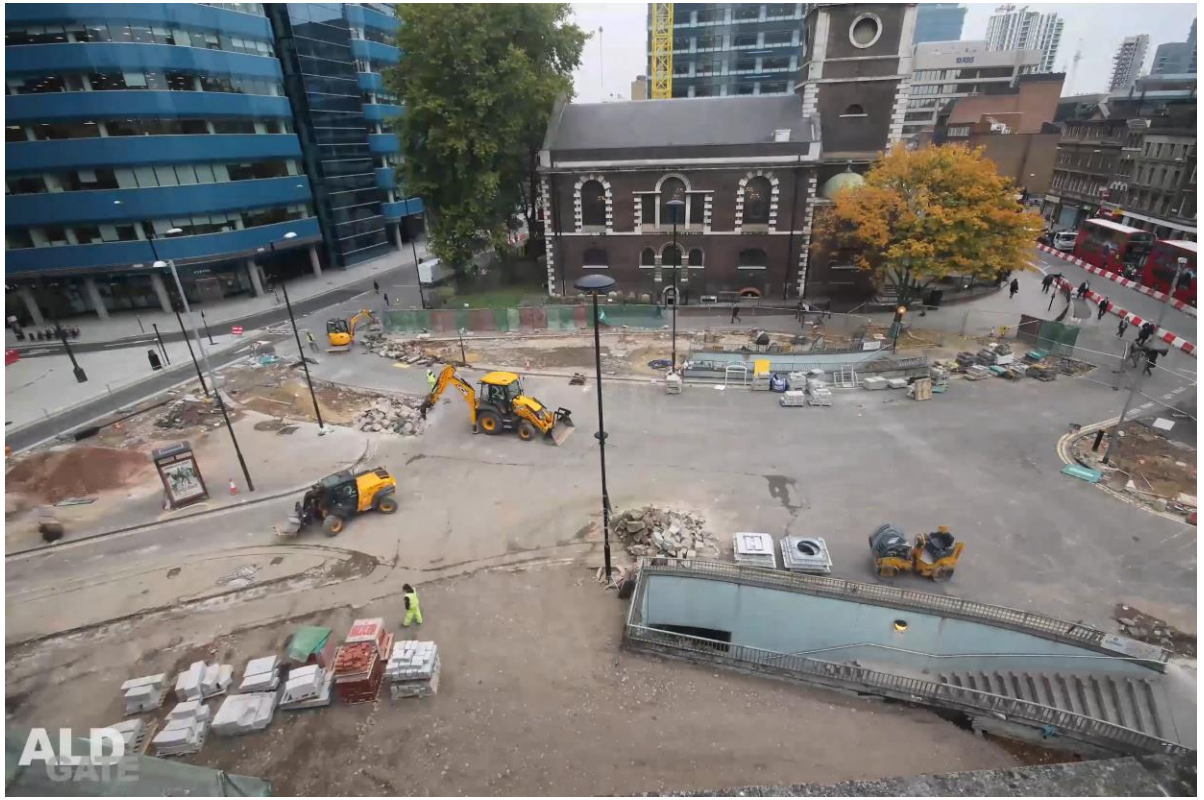
GEOSPATIAL SURVEYS

Aldgate Gyratory

City of London Corporation:

The survey data was employed throughout the life of the scheme, from initial through to detailed design stages as well as through the entire construction phase. The video below shows how working with a utility company it was possible to 'slew' their duct work without comprising their network, all agreed and planned using the supplied obstruction/utility data:



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GEOSPATIAL SURVEYS

Aldgate Gyratory

The survey data also:

- Decreased the need for exploratory trial holes; for example, 72 trees were planted as part of the scheme and each location was successfully determined from the survey data supplied, without first breaking ground.
- A number of buried chambers were located through the survey works which could have proved financially damaging to the scheme if not having been identified prior to the construction phase.
- Less on site decisions required due to the removal of unexpected encounters, less disputes with contractors and less claims.
- Further large savings made through using the survey data to determine areas where the existing carriageway could be kept and targeting only where it had to be replaced.
- The visualisation helped stakeholders understand the complexity of the task, the sharing of this data and the utility data with the utility companies themselves helped cooperation and aided in the successful completion of the scheme.
- The data was used to provide contractors who were breaking ground with enhanced information which hugely reduced their risks when excavating.

Simon Rollinson City Engineer on the Aldgate Regeneration Scheme:

"The collaborative approach with Macleod Simmonds helped the City of London to implement a project that had reduced costs, reduced programme and reduced disruption to the general public"

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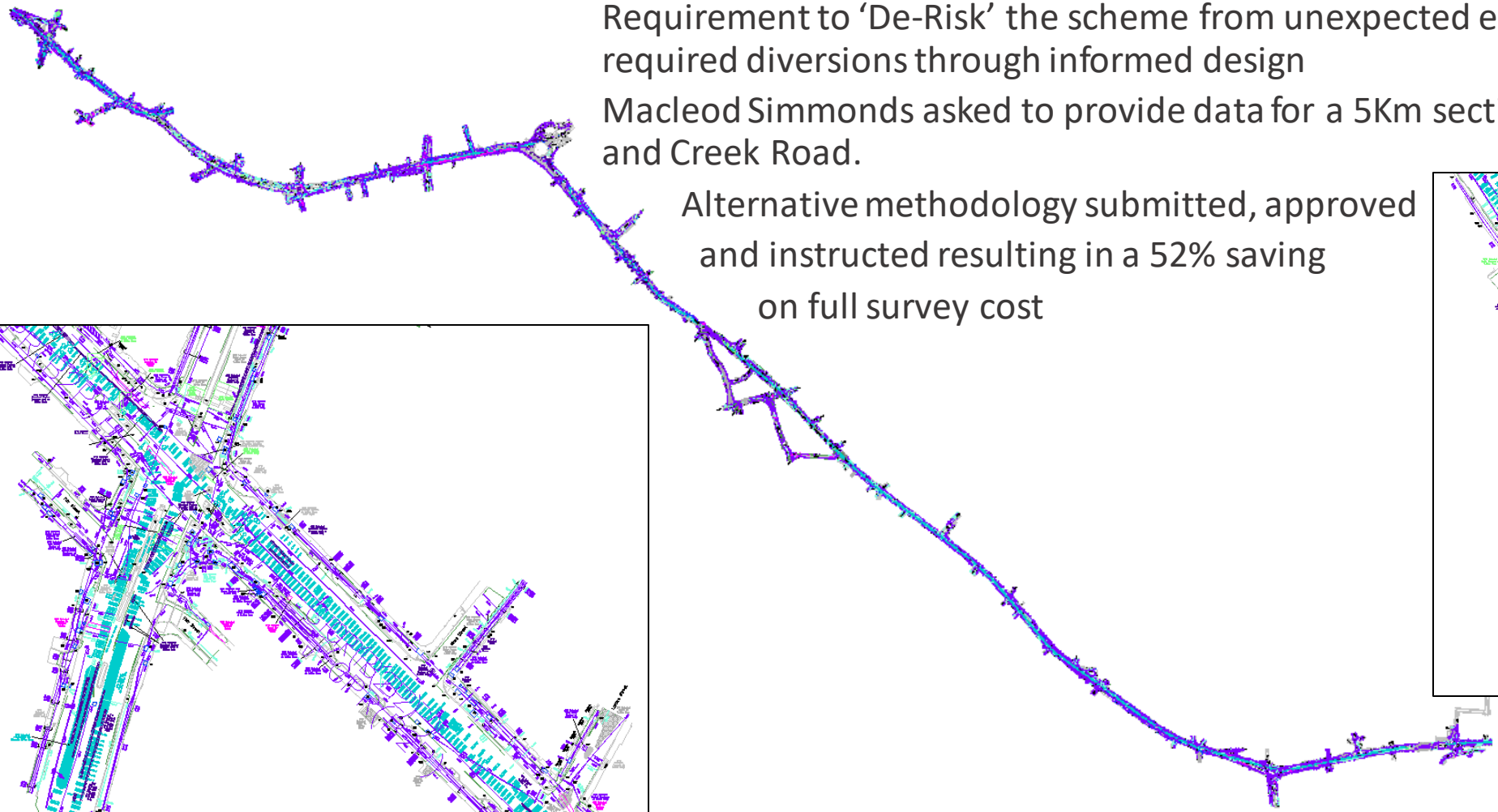
GEOSPATIAL SURVEYS

Aldgate Gyratory

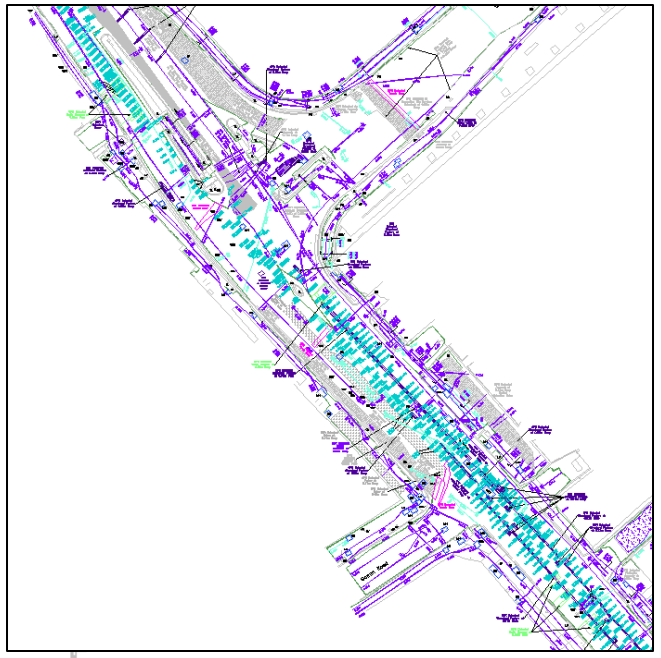
Cycle Superhighway 4



Requirement to 'De-Risk' the scheme from unexpected encounters and limited required diversions through informed design

Macleod Simmonds asked to provide data for a 5Km section between Tooley Street and Creek Road.

Alternative methodology submitted, approved and instructed resulting in a 52% saving on full survey cost



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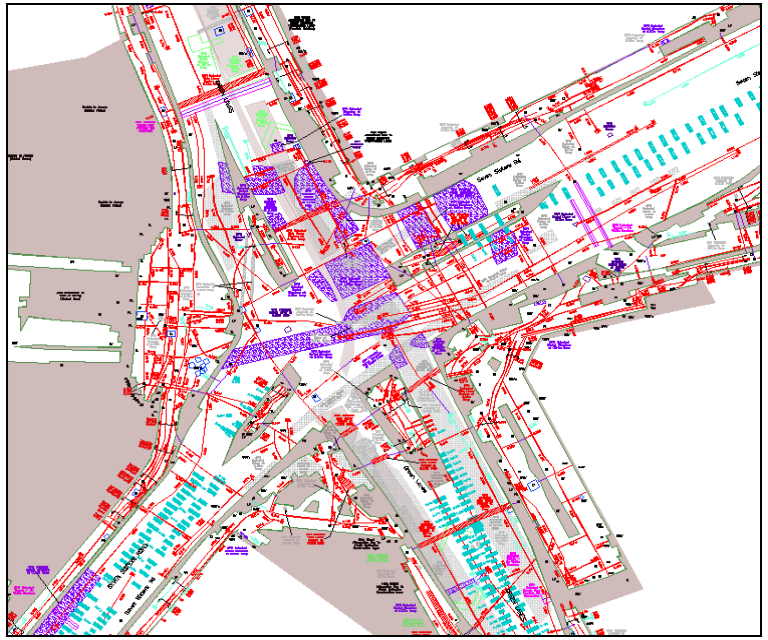
GEOSPATIAL SURVEYS

A 5Km Fully detailed HDAGPR Survey

The whole route is surveyed using our HDAGPR technology and the results presented to the designers to inform preliminary designs.

Strategic locations then agreed for EML and pit lifting works, where they are needed to confirm conflicts or verify details where SED's are required.

These areas then brought up to PAS128:2014 M4p specification level (plus structures) for use in the detailed design and subsequent construction phases.



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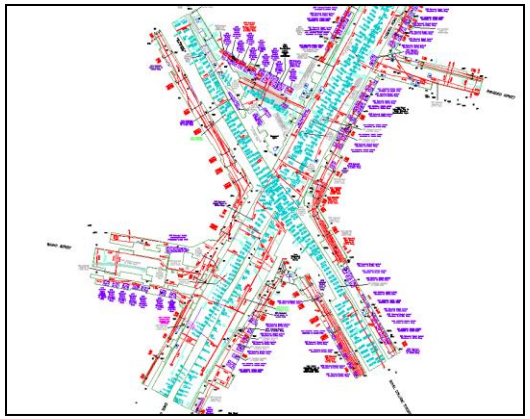
GEOSPATIAL SURVEYS

Cycle Superhighway 4

Requirement to 'De-Risk' the scheme from unexpected encounters and limited required diversions through informed design

Macleod Simmonds asked to provide data for a 5Km section between Tooley Street and Creek Road.

Alternative to 'Full PAS128 plus subsurface structures/feature survey' offered



Quoted Fee for full PAS128:2014 survey:	£350,710.00 +Vat (not commissioned)
Quoted Fee for HDAGPR Only:	£98,255.00 +Vat (Instructed)
Quoted Fee for Targeted EML:	£70,945.00 +Vat (Instructed)

Resulting in the survey delivering exactly the information required for 48% of the expected cost.

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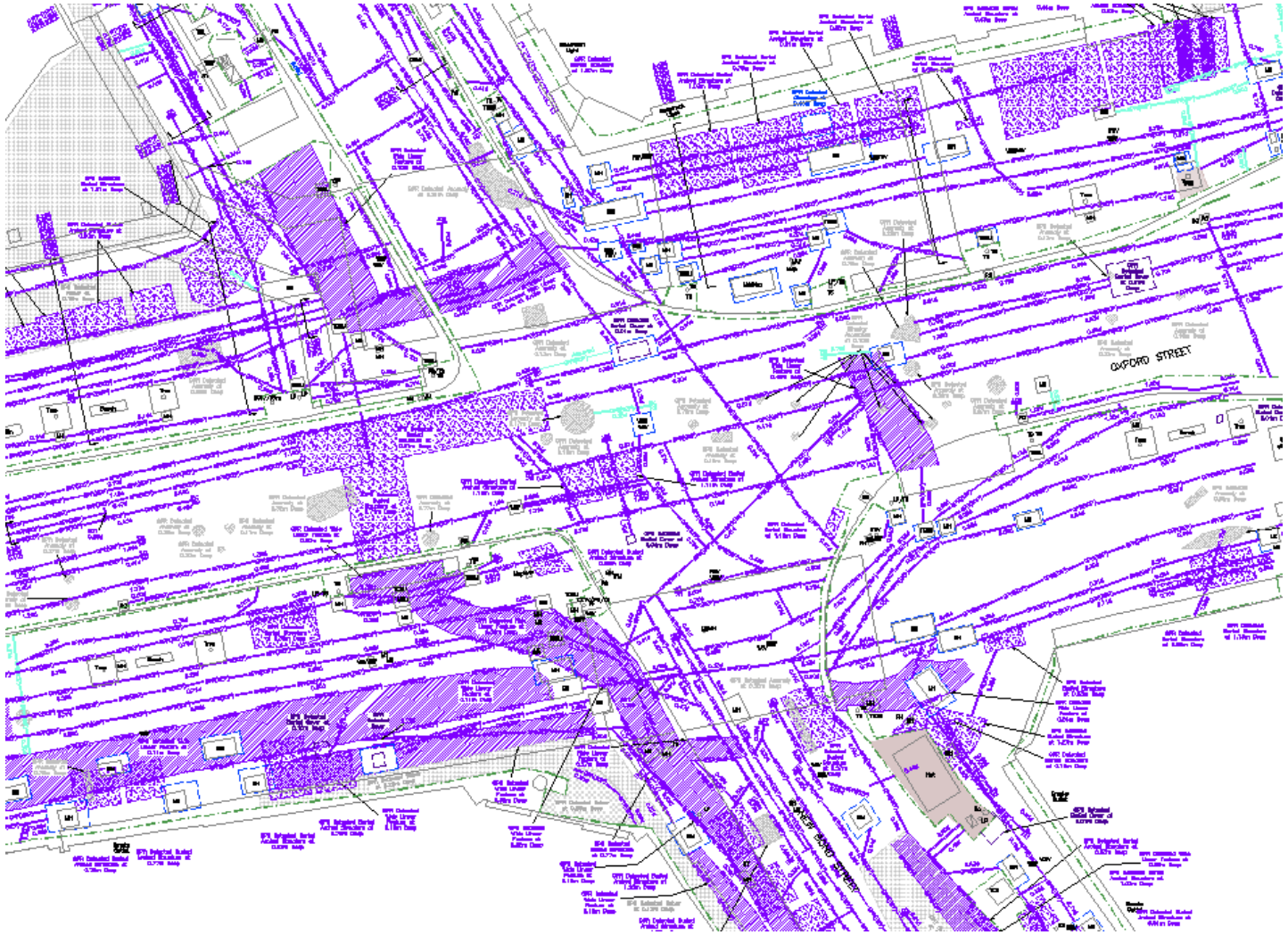
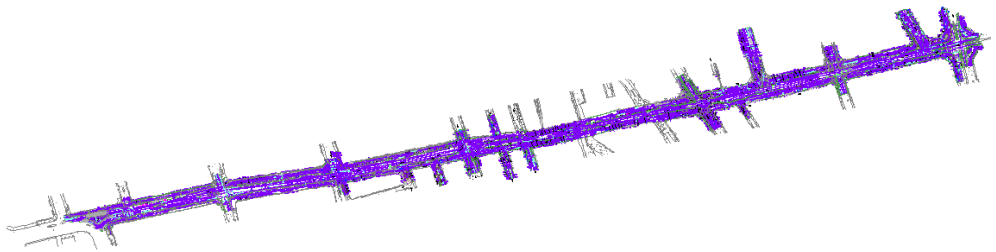
GEOSPATIAL SURVEYS

New Approach now standard





A section of the Oxford Street HDAGPR only survey

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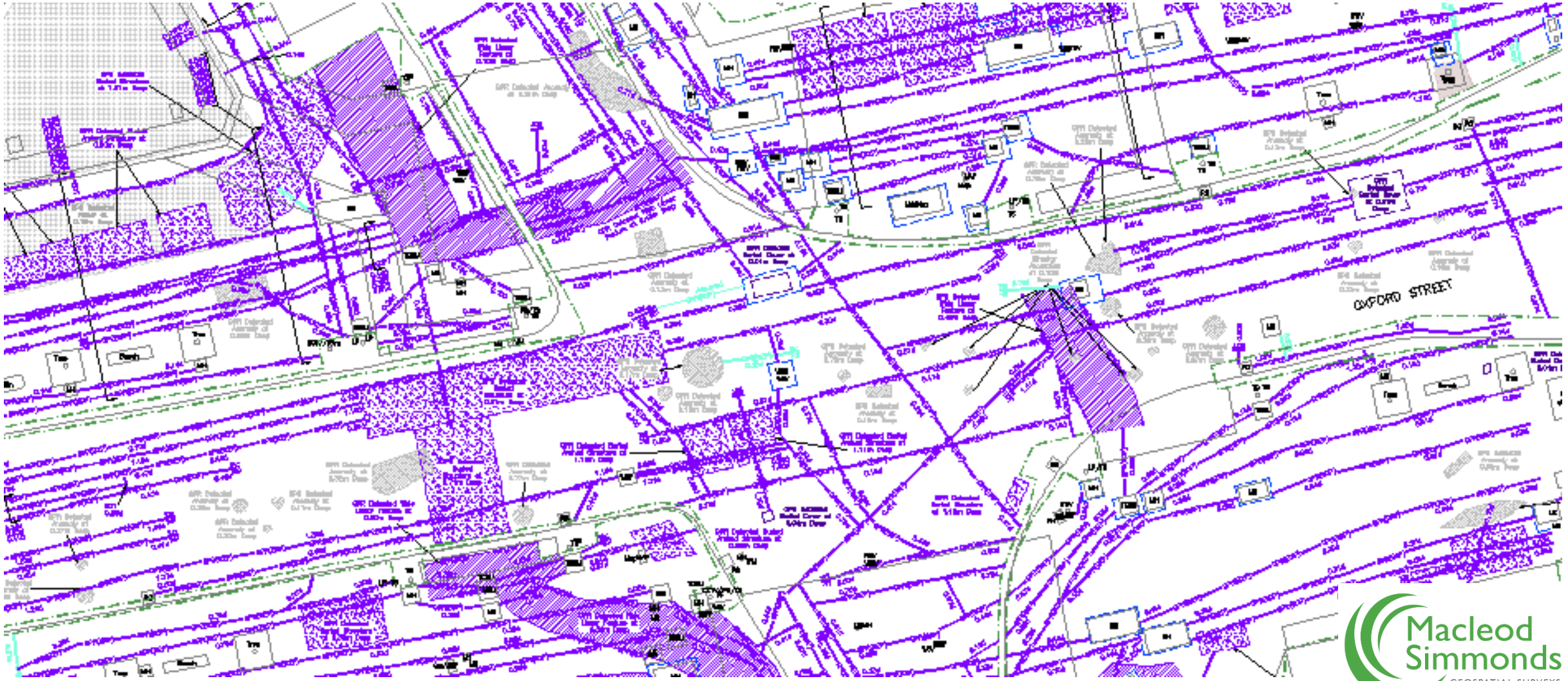
Questions?



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