



Staking University

3-Day EM & GPR Masterclass

October 27th - October 29th | Fair Oaks Farms

I. Field exercises using EM

- a. Demonstrate how the electromagnetic field behaves
- b. Demonstrate the functions of the various receiver antennas
- c. Compare results using conductive versus using inductive

II. Field exercises using GPR

- a. Set up and calibrate the GPR system
- b. Select appropriate antennas and frequencies for various site conditions
- c. Conduct line and grid surveys on test sites containing known and unknown utilities
- d. Record and interpret radar profiles in real-time
- e. Compare GPR detections to EM locating results for cross-validation

III. How EM and GPR are similar and different

a. Similarities

- 1) Transmitter and receiver systems – both techniques use transmitted electromagnetic energy and receive a returned or induced response
- 2) Frequency dependence – both rely on the choice of operating frequency to balance depth and resolution
- 3) Signal behavior – both experience constructive and destructive interference that can enhance or obscure targets
- 4) Energy propagation – in both, transmitted energy tends to spread outward in all directions and is affected by subsurface conditions

5) Data interpretation – both require understanding signal strength, pattern recognition, and geometry to infer subsurface structure and object type

b. Differences

1) Type of electromagnetic field – EM locating measures the induced magnetic field from a continuous current while GPR measures reflected radar waves from short electromagnetic pulses

2) Signal generation and control – EM results depend on the transmitter–utility coupling and current flow; GPR results depend on the dielectric contrast and pulse reflection

3) Data form – EM provides an immediate peak/null response and line trace; GPR produces a time-based image section (radargram)

4) Influence of operator settings – EM tracing results are mostly determined by field setup and utility characteristics, while GPR imaging can be refined by adjusting acquisition and processing parameters

5) Primary measurement – EM quantifies current flow and magnetic response; GPR measures two-way travel time of radar reflections

IV. Grids and practical applications of integrating EM results with GPR results

- a. Visual observation
- b. Knowledge of utility systems--Endpoints
- c. Gleaning information from utility maps
- d. Establishing a command of EM and GPR instrumentation

V. Geographic area projects for integrating EM and GPR to produce mapping subsurface mapping