How to find a cable manhole cover that is buried with concrete

In the complex underground network system, there are some low-voltage 10kv and high-voltage 110kv transmission cables supporting the entire city power supply system. In order to facilitate the follow-up inspection and maintenance, the inspection manhole covers will be installed on the power pipe trench every tens of meters, and marked on the ground.

However, in some road repair and reconstruction of municipal engineering, due to the lack of timely communication, there often appear cable manhole covers and above-ground markers covered by new soil or asphalt layer, which increases the difficulty for the subsequent inspection and maintenance of the city cable. Quickly finding the location of the power manhole cover and re-marking it on the resurfaced road has become a major headache for cable maintenance personnel.

According to the different transmission voltage and cable duct, there are two styles of iron manhole cover and reinforced concrete manhole cover. The concrete manhole covers on the power lines will be reinforced by steel. This article will introduce an efficient way to detect the steel bar in the well cover using ground penetrating radar (GPR), and locate the reinforced concrete well cover.

When the GPR detects the reinforced concrete manhole cover, in the black and white map (Fig. 1, Fig. 2), it will show the orderly arrangement of the reinforcement signal; In the "hot spot" map (Figure 3, Figure 4), an orderly arrangement of reinforcement "hot spots" signal is displayed. In the process of pushing and pulling ground penetrating radar, the range and depth of reinforced concrete manhole cover can be determined according to the signal of reinforcement in radar.

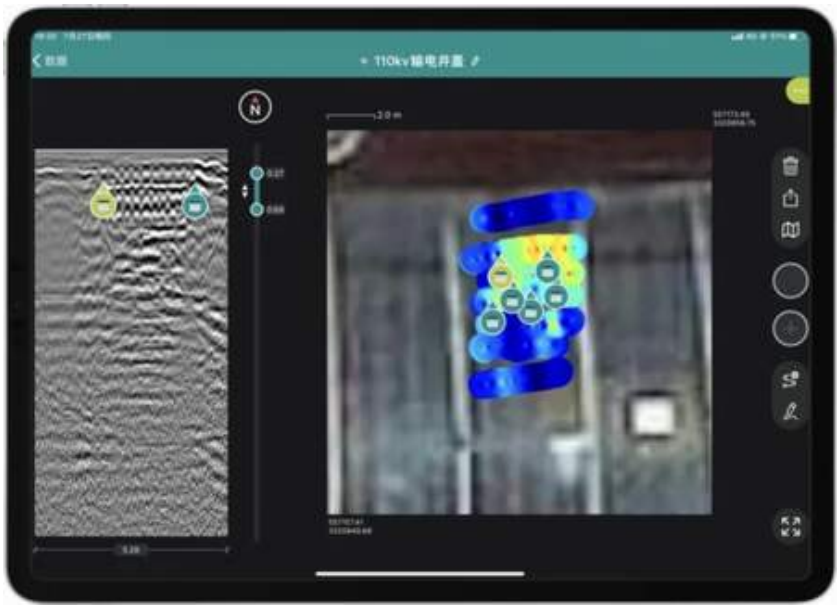

Figure 1

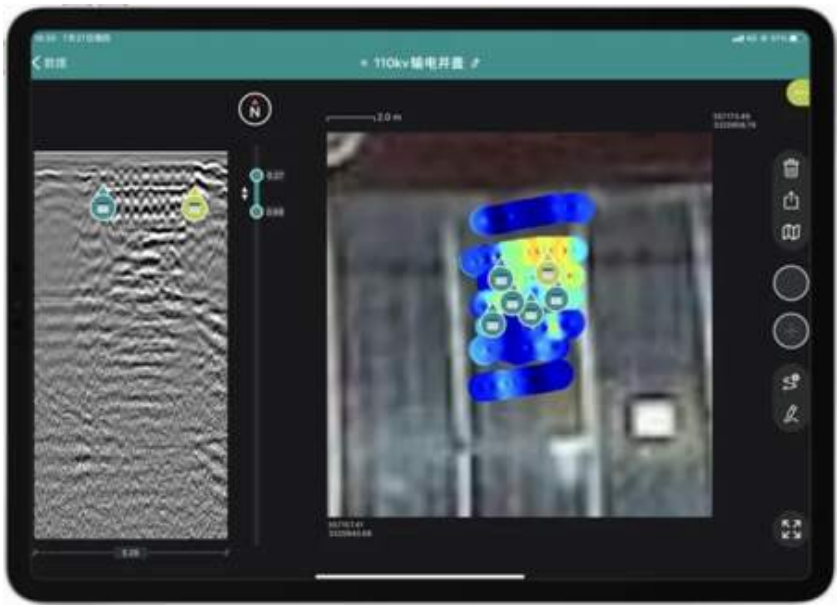

Figure 2

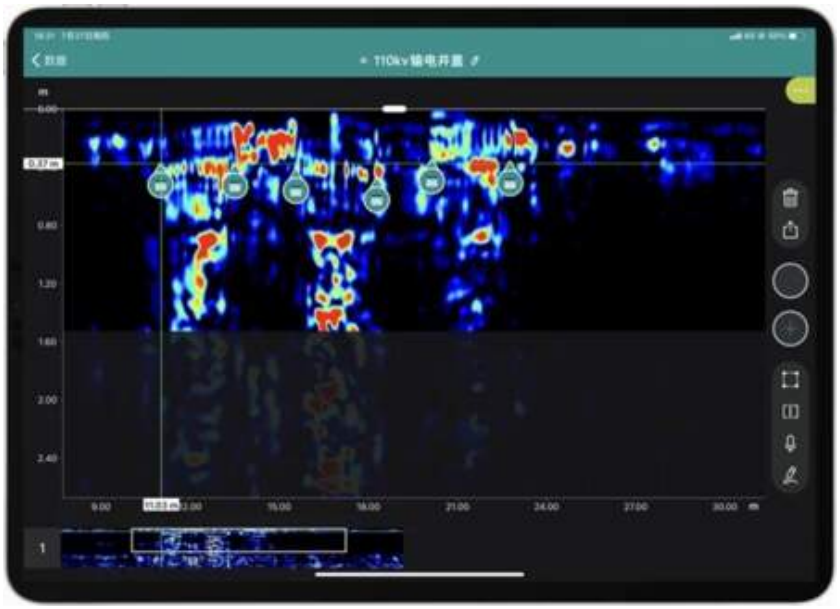

Figure 3

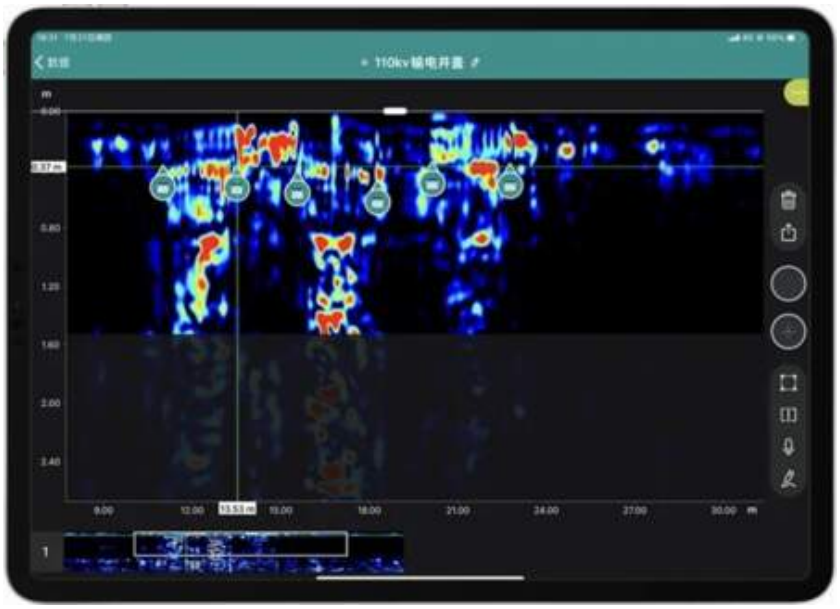

Figure 4

Application Case

There are some high-voltage cables underground in the open-air parking lot of a residential area. Due to improper management and control, the construction team mistakenly buried the electric steel concrete manhole cover with 110Kv mark. When the property discovered the situation, it was quickly reported, however they were unable to locate the power cover due to the lack of an up-to-date map of underground utilities in the area. Patrol Eagle Intelligence Inspection was invited by the local municipal testing unit to help find the power manhole cover under the area.

Solutions

Proceq GS8000 GPR was used to detect the electric manhole cover. Stepped-Frequency Continuous Wave (SFCW) provides the GS8000 with an ultra-wide bandwidth: low and high frequencies to achieve a powerful combination of penetration depth and resolution, even in challenging surface conditions. The Proceq GPR Subsurface application visualizes 3D slices of radar data in the field with accurate geolocation in real-time via the integrated GNSS receiver MA8000. The detected power manhole cover locations are then mapped and visualized immediately on the iPad.

Project outcome

Through free path scanning, the radar image with obvious characteristics of underground manhole cover is accurately detected, and its position is accurately located. Finally, the buried depth of the underground manhole cover is about 70 cm, about 3 m long and 2-3 m wide in the north-south direction. The municipal administration immediately added the cover information to the system.

See more application notes for ground penetrating radar in our Tech Hub.