# Proceq GPR

## Ground Penetrating Radar

User Manual

## Document Information

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|---|---|
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## Revision History

| Rev | Date | Author, Comments |
|---|---|---|
| 1.0 | June 01, 2024 | HELG |

# Content

## Legal Notice

This document contains important information on the safety, use and maintenance of Proceq products. Read through this document carefully before the first use of the instrument. Observe the safety and warning notes in this documentation and on the product. This is a prerequisite for safe working and trouble-free operation.

### *Symbols used*

This icon signals important information, specifications, proper working procedure and to avoid data loss, damage or destruction of the instrument.

This note signifies a warning about dangers to life and limb if the apparatus is handled improperly. Observe these notes and be particularly careful in these cases. Also inform other users on all safety notes. Besides the notes in this instruction manual the generally applicable safety instructions and regulations for prevention of accidents must be observed.

### *Limitation of use*

The instrument is only to be used for its designated purpose as described herein.

- Replace faulty components only with original replacement parts from Proceq.
- Accessories should only be installed or connected to the instrument if they are expressly authorized by Proceq. If other accessories are installed or connected to the instrument then Proceq will accept no liability and the product guarantee is forfeited.

### *Liability*

Our “General Terms and Conditions of Sales and Delivery” apply in all cases. Warranty and liability claims arising from personal injury and damage to property cannot be upheld if they are due to one or more of the following causes:

- Failure to use the instrument in accordance with its designated use as described in the product documentation.
- Incorrect performance check for operation and maintenance of the instrument and its components.
- Failure to adhere to the instructions dealing with the performance check, operation and maintenance of the instrument and its components.
- Unauthorised modifications to the instrument and its components.
- Serious damage resulting from the effects of foreign bodies, accidents, vandalism and force majeure. All information contained in this documentation is presented in good faith and believed to be correct. Proceq AG makes no warranties and excludes all liability as to the completeness and/or accuracy of the information.

### *Safety Instructions*

The equipment is not allowed to be operated by children or anyone under the influence of alcohol, drugs or pharmaceutical preparations. Anyone who is not familiar with the instrument must be supervised when using the equipment.

### *Reserved Rights*

The content of this document is intellectual property of Proceq SA and prohibited to be copied neither in a photomechanical or electronic way, nor in excerpts, saved and/or be passed on to other persons and institutions. This document can be changed at any time and without any prenotification or announcement.

Unauthorized modifications and changes of the product are not permitted.

### *Damages during carriage*

On receipt of the goods, check for any visible damages on the packaging. If it is undamaged you may sign the receipt of the goods. If you do suspect by visual inspection that damage has occurred, make a note of the visible damage on the delivery receipt and request the courier to countersign it. Moreover, the courier service must be held responsible for the damage in writing.

If a hidden damage is discovered while unpacking, you have to inform and hold the courier liable immediately in the following way: “When opening the parcel we had to notice that … etc.“ This superficial checking of the goods has to be done within the time limit set by the carrier, which is normally 7 days. However, the period could vary depending on the courier. Hence, it is recommended to check the exact time limit when receiving the goods.

If there are any damages also inform your authorized Proceq agent or **Proceq SA** immediately.

### *Shipment*

Should the device be transported again, it must be packaged properly. Preferably use the original packaging for later shipments. Additionally, use filling material in the package to protect the device from any shock during carriage.

### *Safety notes and hints*

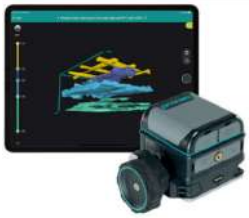
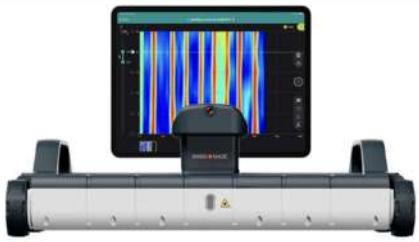
- All maintenance and repair work which is not explicitly permitted and described in the present manual shall only be carried out by **Proceq SA** or your authorized service center, failure to comply voids warranty.
- **Proceq SA** refuses all warranty and liability claims for damages caused by usage of the product in combination with **non-original accessories**, or accessories from 3rd party suppliers.
- Never immerse the device in water or other liquids: **Danger of short circuit!**
- Never leave the product under direct sun exposure. Always store the product in its carrying case.

For the operation of the product all local safety regulations apply.

# 1 Introduction

The Proceq GPR family are high quality handheld ground penetrating radar (GPR) instruments used to detect various objects in concrete structures such as rebar, post-tensioning duct, pipes, voids & conduits.

The Proceq GPR family offers 3 powerful versions for all application needs:

| GP8000 | GP8800 | GP8100 |
|---|---|---|
|  |  |  |

The product consists of

- The GP8000 or GP8800 or GP8100 high-performance sensor
- the GP iOS app
- and the Screening Eagle Workspace platform.

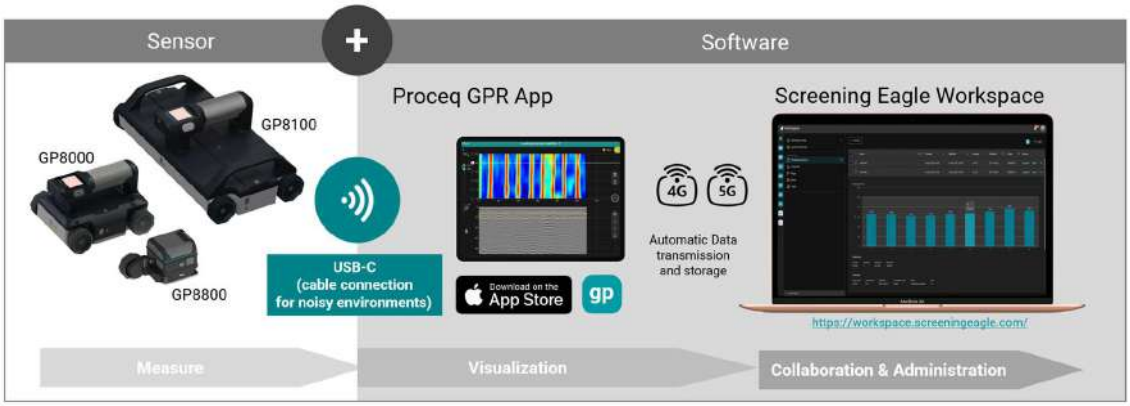



*Figure 1: Proceq GPR System*

## 1.1 Scope of this document

This document is the user manual for all products of the Proceq GPR Product family. Therefore, some pictures or functional descriptions may differ from your model.

## 1.2 Product versions

To be able to use the functionality of the GP app, a software license is required. The following licenses are available and offer different functionality.

Please refer to the table below for the supported features of the respective licenses:

| | GP8000 | GP8800 | GP8100 |
|---|---|---|---|
| **Sensor radar technology** | Stepped-frequency continuous-wave (SFCW) GPR | | |
| **Antenna** | 1 | 1 (w. cross-polarization set) | 6 (array) |
| **Modulated frequency range** | 200 – 4000 MHz | 400 – 6000 MHz | 400 – 4000 MHz |
| **Penetration depth**[1] | 150 cm / 60 in | 65 cm / 26 in | 80 cm / 32 in |
| **Measurement Modes** | Line Scan<br>Area Scan | Line Scan<br>Area Scan | Superline Scan<br>Line Scan<br>Area Scan |
| **View modes** | A-scan (incl. envelope)<br>Non-migrated view<br>Migrated heatmap view<br><br><br>Time-slice view<br>3D view<br>Augmented Reality (AR)<br>Live Wire | A-scan (incl. envelope)<br>Non-migrated view<br>Migrated heatmap view<br><br><br>Time-slice view<br>3D view<br>Augmented Reality (AR) | A-scan (incl. envelope)<br>Non-migrated view<br>Migrated heatmap view<br>Split view<br>Unidirectional time-slice view<br>Time-slice view<br>3D view<br>Augmented Reality (AR)<br>Live Wire |
| **Image processing** | Auto-gain<br>Linear Gain<br>Time Gain Compensation<br>Noise Cancellation<br>Background removal<br>Depth/Time window<br>Dielectric constant<br>Live Wire Threshold level<br>Markers, annotations | Auto-gain<br>Linear Gain<br>Time Gain Compensation<br>Noise Cancellation<br>Background removal<br><br>Dielectric constant<br><br>Markers, annotations | Auto-gain<br>Linear Gain<br>Time Gain Compensation<br>Noise Cancellation<br>Background removal<br><br>Dielectric constant<br>Live Wire Threshold level<br>Markers, annotations |
| **Logbook** | Measurements data, Instrument Information, Pictures, Geolocation, text notes, audio notes, configuration log | Measurements data, Instrument Information, Pictures, Geolocation, text notes, audio notes, configuration log | Measurements data, Instrument Information, Pictures, Geolocation, text notes, audio notes, configuration log |
| **Data Sharing** | URL exchange | URL exchange | URL exchange |
| **Data Exporting** | CSV<br>HTML<br>JPG (Snapshot)<br>SEGY | CSV<br>HTML<br>JPG (Snapshot)<br>SEGY | CSV<br>HTML<br>JPG (Snapshot)<br>SEGY |
| **Data Synchronization** | Screening Eagle Workspace<br>Screening Eagle Inspect Integration | Screening Eagle Workspace<br>Screening Eagle Inspect integration | Screening Eagle Workspace<br>Screening Eagle Inspect integration |

[1] For dielectric constant concrete (permittivity) = 7

## 1.3 Product applications

Each sensor is suitable for different applications & conditions as described in Figure 2

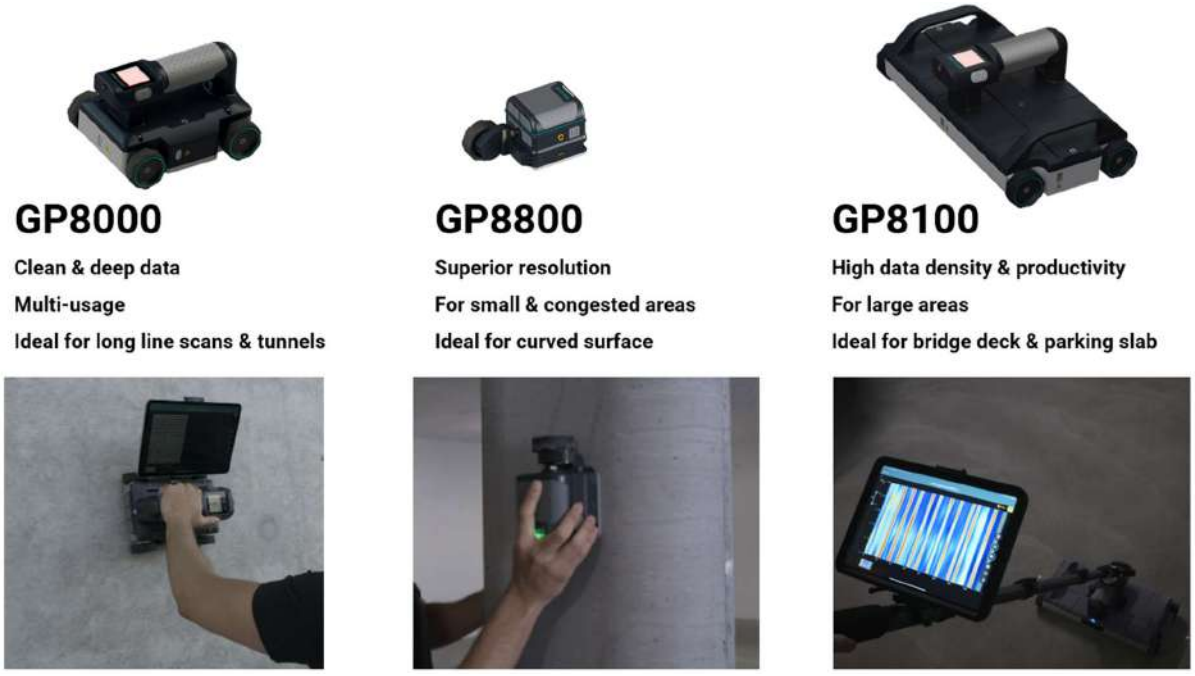



*Figure 2: Proceq GPR applications*

# 2 Scope of Delivery

Please refer to the Quick Start Guide provided in the standard delivery and available in download section of the product webpage:

SET-GP8X00-QSG-200x140-240408-digital.pdf (screeningeagle.com)

# 3 Measurement Principle

GPR is the acronym for **G**round **P**enetrating **R**adar, also known as Georadar, Ground Penetration Radar, or Ground Probing Radar. Proceq GPR is a compact device that scans the subsurface in a non-destructive way. It can penetrate the surface, based on concrete conditions and antenna characteristics.

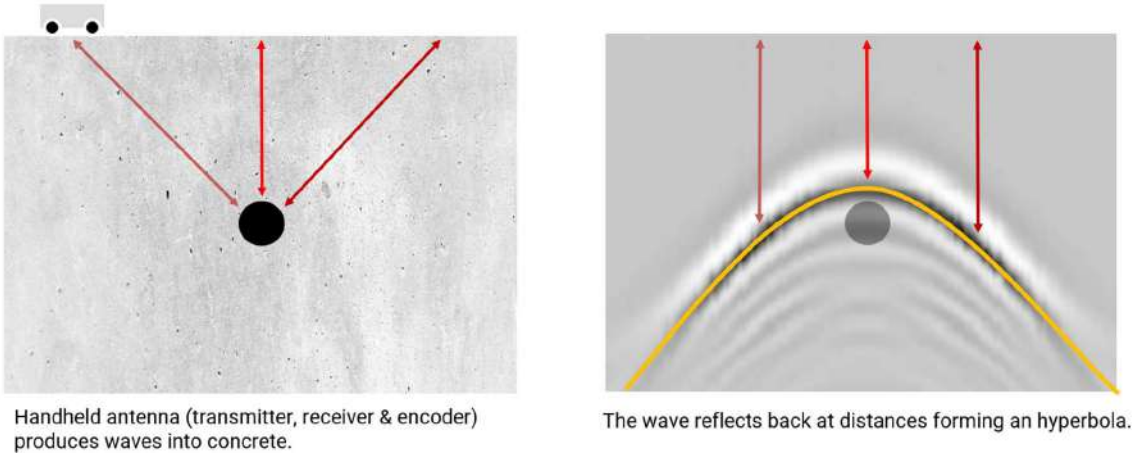



*Figure 3: Measurement principle*

Proceq GPR devices use stepped-frequency-continuous-wave (SFCW) technology. Unlike pulsed-GPR broadcasting a signal centered around one frequency, resulting in a trade-off between resolution and depth for inspecting, SFCW has the advantage to broadcast an ultra wide-band range of modulated frequencies. The combination of all frequency response enables detection of objects from shallow to deep in one scan.

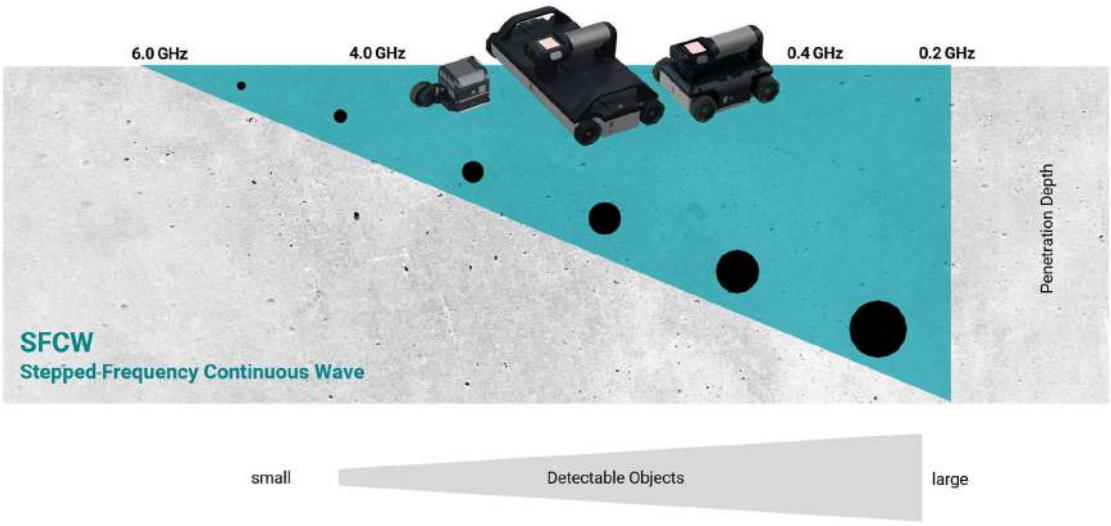



*Figure 4: Stepped-Frequency-Continuous-Wave principle*

# 4 Sensor Overview

## 4.1 Getting Started

Please refer to the Quick Start Guide (included in standard delivery) for first steps with your GP8000, GP8800 or GP8100. The Quick Start Guide is also available in the download section of the product webpage:

SET-GP8X00-QSG-200x140-240408-digital.pdf (screeningeagle.com)

## 4.2 Buttons' function

### 4.2.1 Switch on/off

For GP8000 & GP8100:

- Turn on: long press 1 second the switch on/off button on the back (see Figure 5)
- Turn off: long press 1 second the switch on/off button on the back (see Figure 5)


*Figure 5: GP8000 & GP8100 Switch on/off button*

For GP8800:

- Turn on: long press 1 second one of the two buttons on each side (see Figure 6)
- Turn off: long press 4 seconds one of the two buttons on each side (see Figure 6)


*Figure 6: GP8800 Buttons on each side*

### 4.2.2 Start/Stop measurement

Start/Stop measurement can be also implemented from the software GP iOS app, downloadable from iOS App store. For more information, please watch tutorial videos available in GP app or YouTube (Screening Eagle Technologies channel).

For GP8000 & GP8100

There are two ways to start/stop measurements:

- Start/stop: short press one of the two buttons on the handle (see Figure 7).


*Figure 7: GP8000 & GP8100 Action buttons on each side*

- Start/stop: short press touchscreen following Figure 8


*Figure 8 : GP8000 & GP8100 Touchscreen functions*

For GP8800

Start/stop: short press one of the two buttons on each side (see Figure 9).


*Figure 9: GP8800 Buttons on each side*

### 4.2.3 Set marker

Marking digitally identified objects on the iPad screen can be also implemented from the software GP iOS app. For more information, please watch tutorial videos available in GP app or YouTube (Screening Eagle Technologies channel).

For GP8000 & GP8100

By default, “backward marking mode” is activated:

- IF device position is at front line, short press one button on side or touchscreen THEN STOP
- IF device is in back position, short press one button on side or touchscreen THEN MARK

When selected by the user, “forward marking mode”:

- IF device position is at front line, short press one button on side or touchscreen THEN MARK
- IF device is at any position and user double-pushes one button on side or touchscreen THEN STOP

For GP8800

By default, “backward marking mode” is activated:

- IF device position is at front line, short press one button on side THEN STOP
- IF device is in back position, short press one button on side THEN MARK

When selected by the user, “forward marking mode”:

- IF device position is at front line, short press one button on side THEN MARK
- IF device is at any position and user double-pushes one button on side THEN STOP

## 4.3 Laser functions (GP8000 & GP8100)

The GP8000 & GP8100 are equipped with a laser to indicate the scan direction & the measurement center point.


*Figure 10: GP8000 & GP8100 Laser*

## 4.4 Flexible wheel mounting (GP8800)

The GP8800 single encoder wheel can be mounted for different purposes:

- To adapt to scanning conditions (ex: congested space).
- To turn the antenna at 90°in cross-polarization mode (see section 5.2)

*Figure 11 : GP8800 flexible wheel mounting*

## 4.5 Multiline (GP8100)

The GP8100 is a GPR array scanner. This means the device scans 6 lines (A, B, C, D, E, F) in only one scan called **Superline scan** (see section 5.3). It is equipped with a LED to facilitate data visualization on the iPad display when the user wishes to focus on one line scan view.

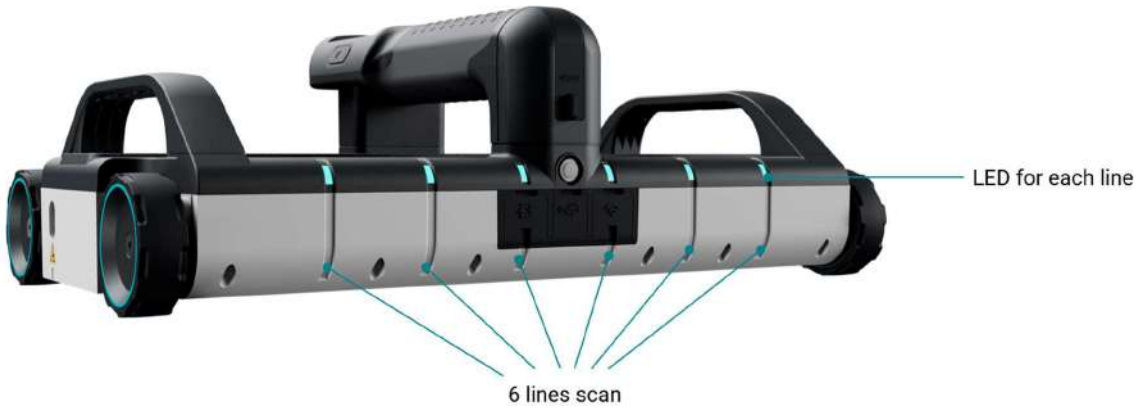



*Figure 12: GP8100 array - 6 lines scan*

# 5 Software overview

The GP app software enables visualization of any scan measurement such as line scan & area scan views with manual zoom. In addition, there is a logbook providing traceability of each measurement: time, operator, position and instrument information, pictures (with iPad camera) and written or voice notes.

Given mobile data connectivity (Wifi or mobile network), the GP app automatically and safely stores all measurements on the Screening Eagle Workspace by synchronizing with the iPad. Reporting can be done from the Screening Eagle Workspace or the app.

- All measurements, settings and image processing tasks are described in tutorial videos available in GP app or YouTube (Screening Eagle Technologies channel).

- Swipe vertically up or down with 2 fingers for navigating between views. Menu is always accessible on the right.

- The slider defining slice thickness & depth is always accessible on the left for time slice & 3D views with color palette.

## 5.1 Line scan

The antenna (transmitter & receiver) above the concrete produces a trace called **A-scan** based on the wave trajectory across air, concrete and reflection on objects, every material has different properties characterized by the dielectric permittivity ε. The reflection is strong on metallic objects (99% of the wave is reflected). The amplitude of A-scan (generally negative for metallic objects, positive for non-metallic objects) indicates the change of material and therefore location of objects at the peak of the amplitude.

When the antenna moves, multiple A-scans are collected along the scan to produce a **B-scan** radargram view. The colorful **migrated view** is a more intuitive way view to identify objects; it is produced from a processing radargram.

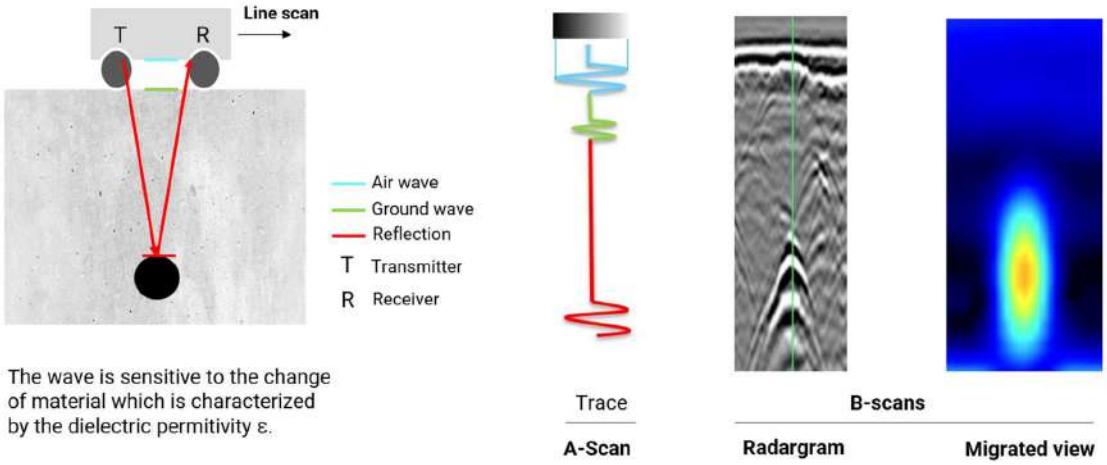



*Figure 13 : A-scan, B-scan & migrated views principles*

GP app software provides a **line scan** measurement view with A-scan on the left, radargram view & migrated view in the center and drop-down menu on the right.

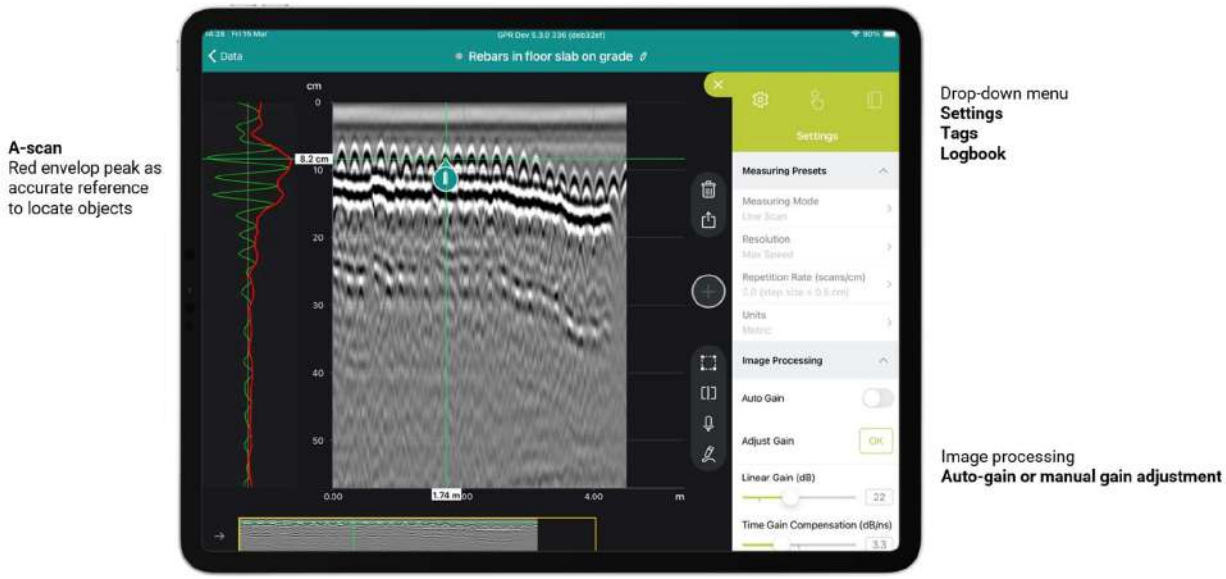



*Figure 14: GP app software line scan raw data view*

Single finger swipe left-right to display or not the A-scan

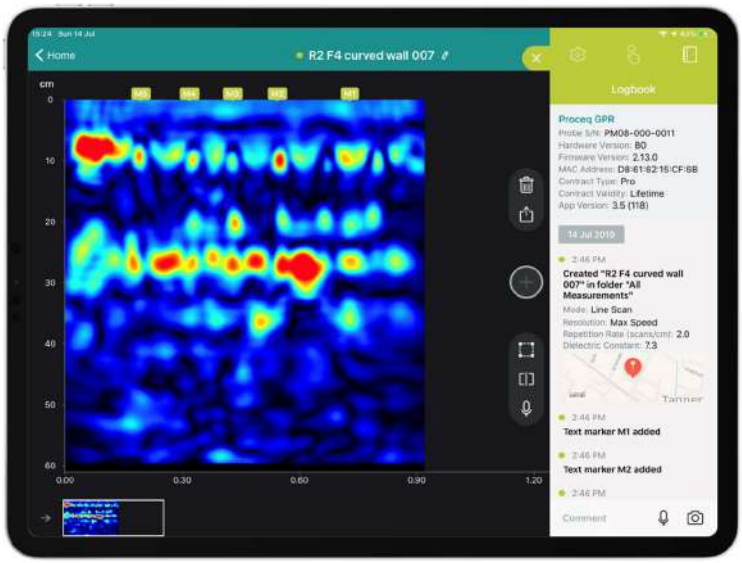



*Figure 15 : GP app software line scan migrated view*

## 5.2 Cross polarized line scan (GP8800)

By aligning the receiver and the transmitter, which means rotating the antenna with a 90° angle, the detection of deeper objects shadowed by upper shallow objects (especially longitudinal targets such as ramping pipes or ducts) becomes easier as explained in Figure 16.

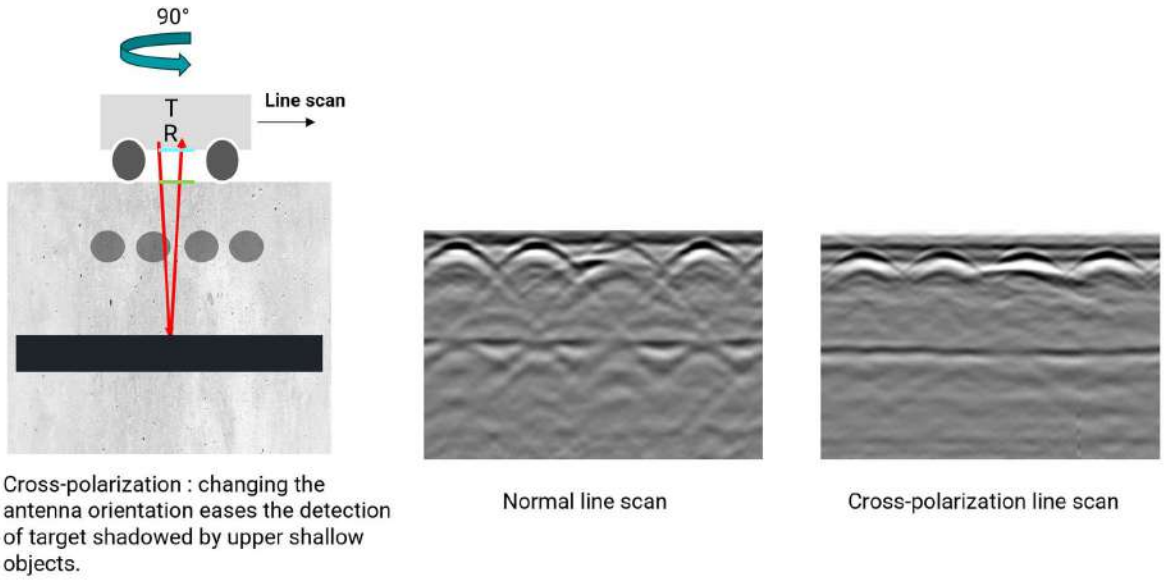



*Figure 16: Cross polarization principle*

The GP8800 is equipped with an antenna with the ability to be cross-polarized changing the orientation (90° rotation as per Figure 17) and the encoder wheel mounting (see Figure 11). The cross-polarized line scan may unveil the presence of deeper/hidden objects.

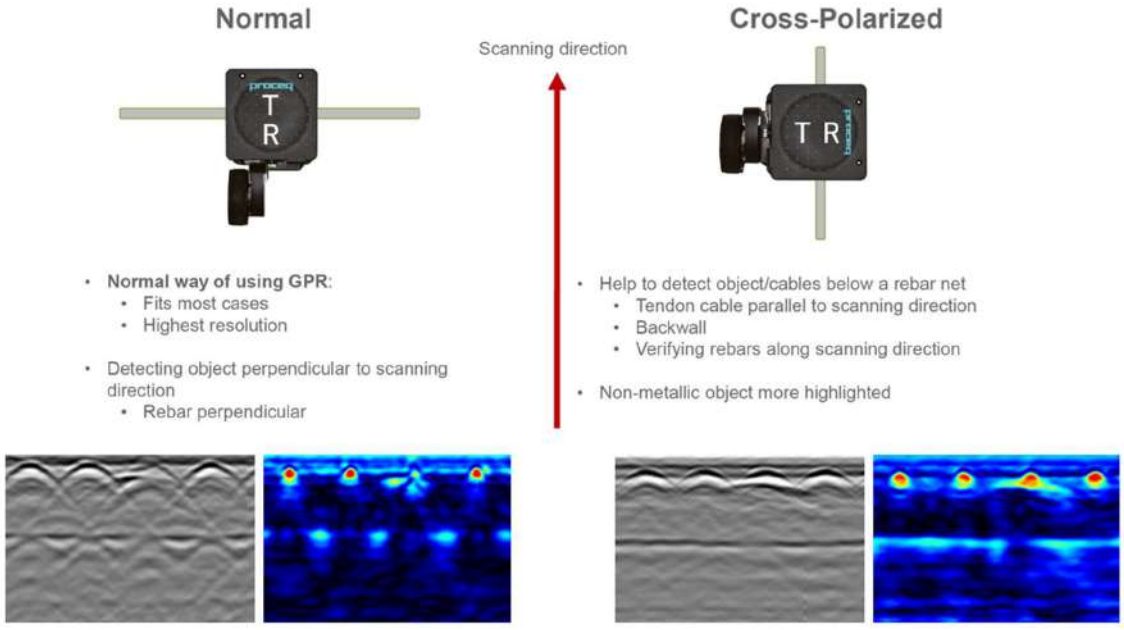



*Figure 17: GP8800 Cross polarization setting*

## 5.3 Superline scan (GP8100)

As explained in section 4.5, the GP8100 array has 6 antennas enabling the measurement of 6 lines scan at the same time. The plan view generated from 6 lines is called **Superline scan**. The superline scan (see Figure 18) generates a time slice view of all objects perpendicular to the scanning direction. The user can adjust the slice thickness and obtain a dynamic plan view from top to bottom by moving the left slider. Any line scan view can be chosen in the split view.

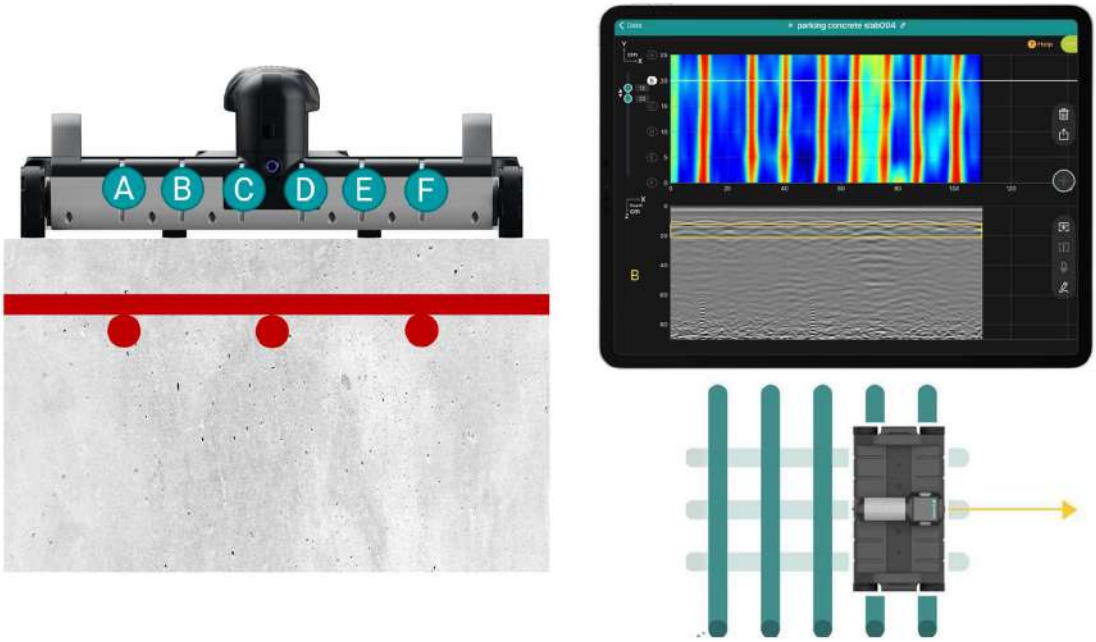



*Figure 18: GP8100 Superline scan*

## 5.4 Area scan

An **area scan**, also called **C-scan**, can be generated from the combination of different line scans in each direction (X & Y) as described in Figure 19.

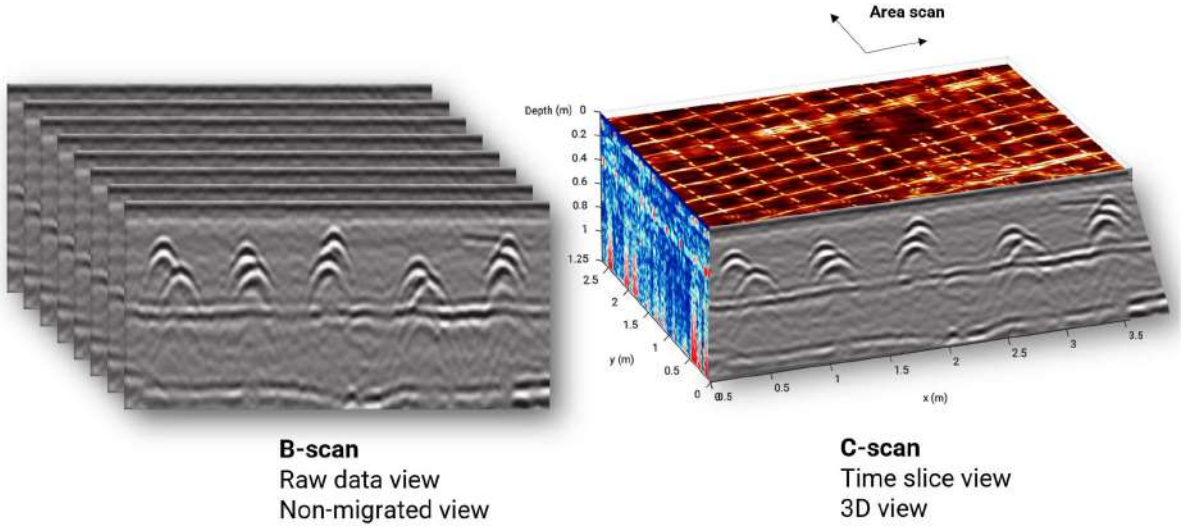



*Figure 19: Area scan, 3D view & time slice view principle*

GP app software provides an **area scan** measurement view (see Figure 20).

### 5.4.1 Time slice view

GP app software produces a **time slice view** (as shown in Figure 20) enhancing the level of comprehension for locating targets. The user can adjust the slice thickness and obtain a dynamic plan view from top to bottom by moving the left slider.

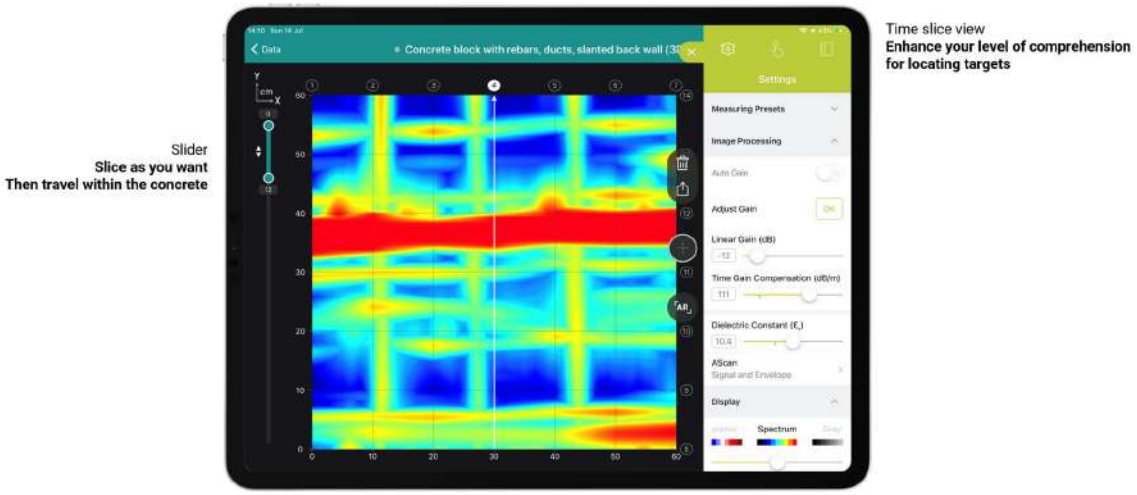



*Figure 20: GP app software area scan & time slice view*

### 5.4.2 3D view

GP app software produces a **3D view** improving the level of comprehension for locating targets. The user can adjust the color for each depth intervals differentiating objects by moving the left slider.

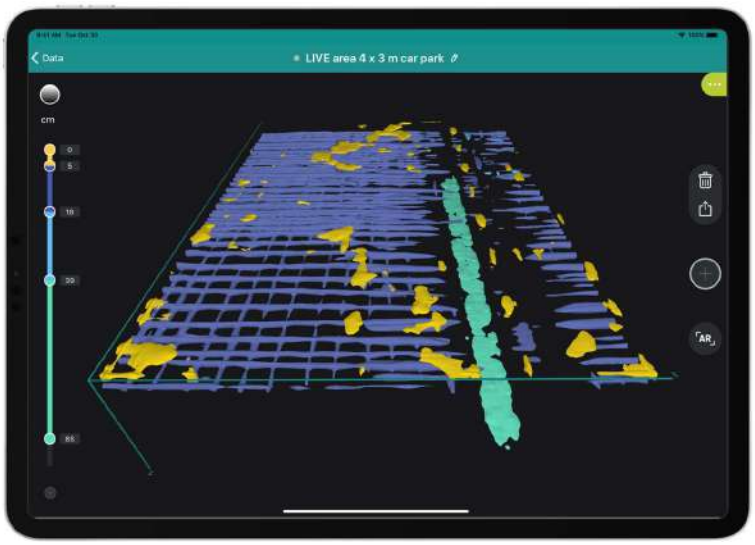



*Figure 21: GP app software 3D view*

### 5.4.3 Augmented reality (AR)

gp app software produces an **Augmented reality (AR) view** of time slice view & 3D views. Screenshots of AR view help to enrich reporting.

*Figure 22: GP app software Augmented Reality view*

- Swipe right/left to increase or decrease the time slice view transparency.
- Swipe up/down with 2 fingers for switching between 3D view and time slice view
- Swipe up/down with 1 finger to move up/down the 3D view

## 5.5 Tags & Live wire detection

The Tag menu on the right enables the user to tag identified targets such as rebar, live wire, void, backwall or defined objects (like post-tension ducts).

GP8000 & GP8100 provide live wire detection (on top of the screen) based on signal strength color intensity that can be adjusted in image processing settings.

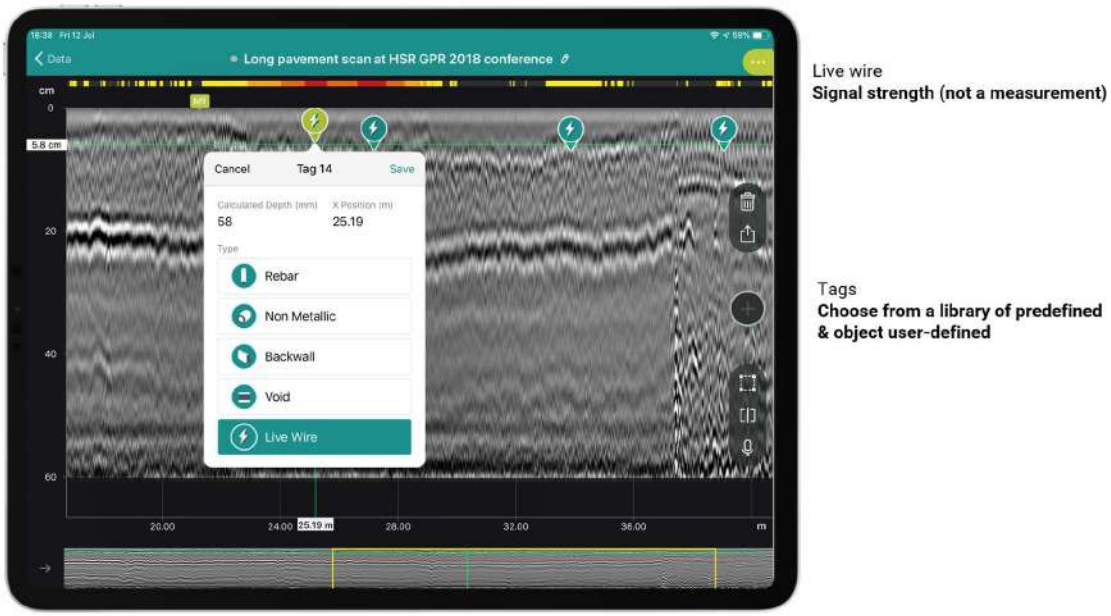



*Figure 23: GP app software Tags & Live wire detection*

## 5.6 Image processing

The Settings menu offers a unique wide range of image processing significantly improving the data quality and the clarity of different views.

### 5.6.1 Gain

Due to GPR energy attenuation in concrete, some objects may appear weak or invisible. By increasing energy through gain, the image can be improved with targets being more visible.

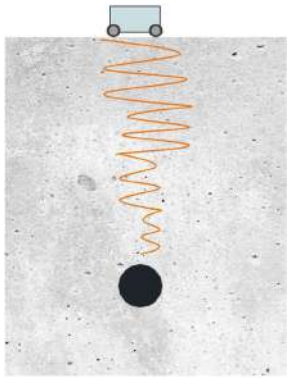


*Figure 24: GPR ground wave's energy attenuation*

GP app software provides in image processing dropdown menu an automatic gain called "**Auto-Gain**" which automatically adjusts the gain and amplifies the signal to improve the image quality. However, it is possible to adjust manually the gain with "**Linear Gain**" & "**Time Gain Compensation**" settings.

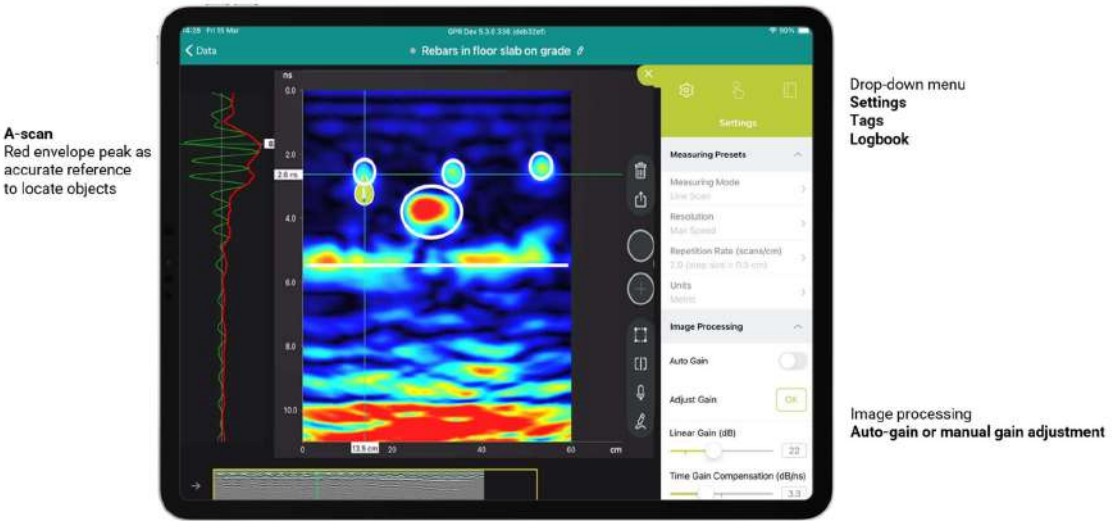



*Figure 25: GP app software image processing auto-gain or manual gain adjustment*

### 5.6.2 Noise cancellation

Interfering noise from close electronics devices, Wi-Fi routers or smartphones may affect the data quality with “typical scare pattern” appearing on measurement views.

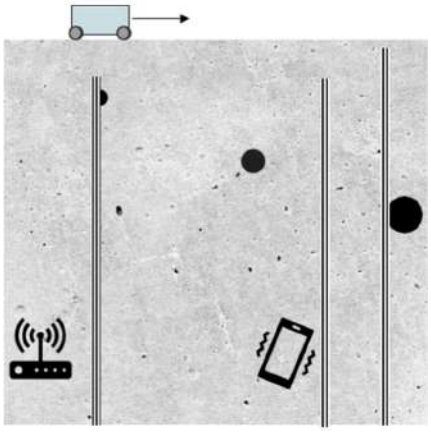


*Figure 26: Noise affecting GPR object detection*

GP app software provides in image processing dropdown menu: the “N**oise Cancellation**” setting which, when activated, noise cancellation removes noise and improves data clarity (Figure 27).

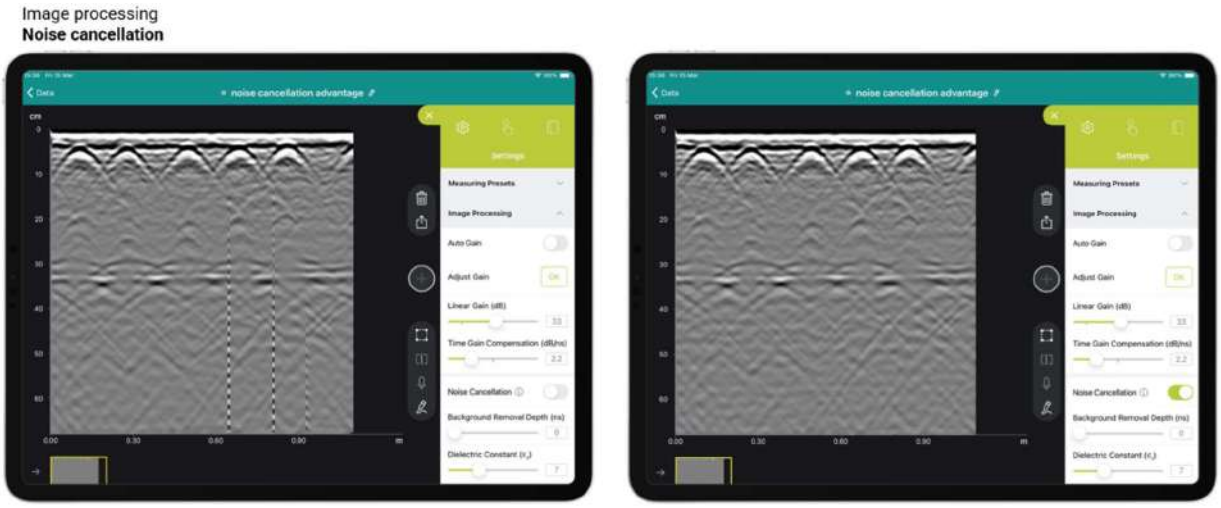



*Figure 27: GP app software image processing noise cancellation*

### 5.6.3 Background removal

In some circumstances, GPR waves from the transmitter are received by the receiver without penetrating the concrete. This creates a disturbance called “background” (visual longitudinal strip) which affects the data quality and may hide shallow targets.

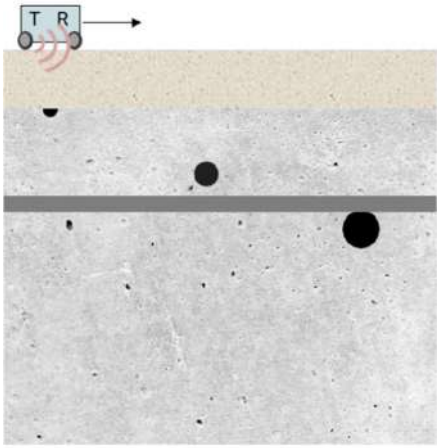



*Figure 28: Background affecting GPR object detection*

GP app software provides in image processing dropdown menu: the “**Background Removal**” setting which, when activated, removes the background, and makes shallow objects easier to see such as rebar as shown in Figure 29.

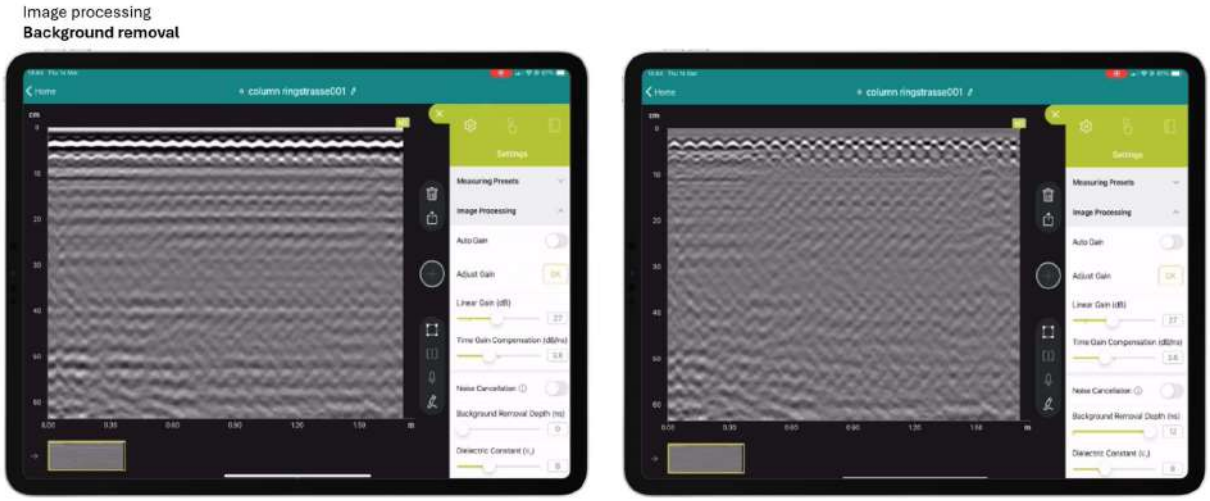



*Figure 29: GP app software image processing background removal*

- Use with caution, background removal may remove desired targets.
- When first viewing a GPR radargram (B Scan), it is advisable to set background removal to zero so as not to remove legitimate linear features from the data.

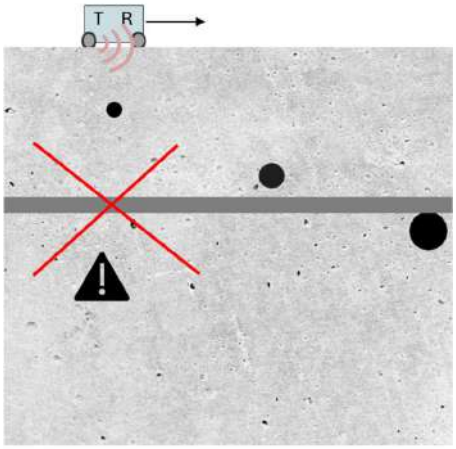



*Figure 30: Background removal warning on longitudinal objects*

### 5.6.4 Dielectric constant

The concrete material characterized by the dielectric ε (permittivity) influences hugely the measurement.

- When concrete is dry (ε<5), GPR waves are less attenuated and can penetrate deeper resulting in more prominent signals/hyperbolas.
- When concrete is wet (ε>9), GPR waves are heavily attenuated by the presence of water resulting in less prominent signals/hyperbolas.

The standard concrete usually has a dielectric (ε) between 6.5 and 7.5.

The dielectric constant of concrete can vary widely not only due to moisture content, but also factors such as the composition of the concrete mix, types of aggregates and the presence of air voids. This is why it is critical to set ε when considering depth and objects' size accuracy.

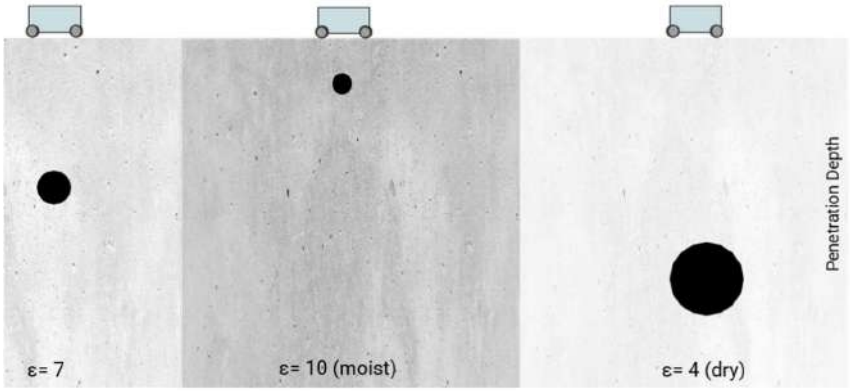



*Figure 31: Concrete dielectric ε principle*

GP app software provides different solutions to adjust the concrete dielectric.

#### *5.6.4.1 Manual setting of dielectric value*

When the concrete dielectric (ε) is known, then the dielectric value can be entered manually in the image processing menu (see Figure 32).

#### *5.6.4.2 Hyperbola fitting dielectric estimation*

When the concrete dielectric (ε) is unknown, then the dielectric can be estimated with the "Hyperbola fitting" feature. By adjusting the dielectric value in image processing menu, the user must fit the new appearing yellow hyperbola on any clean hyperbola of existing object in the raw data view (B-scan) as shown in Figure 32.

Make sure the yellow hyperbola precisely covers-up the object's hyperbola. Try with different clean hyperbolas to confirm the concrete dielectric estimation.

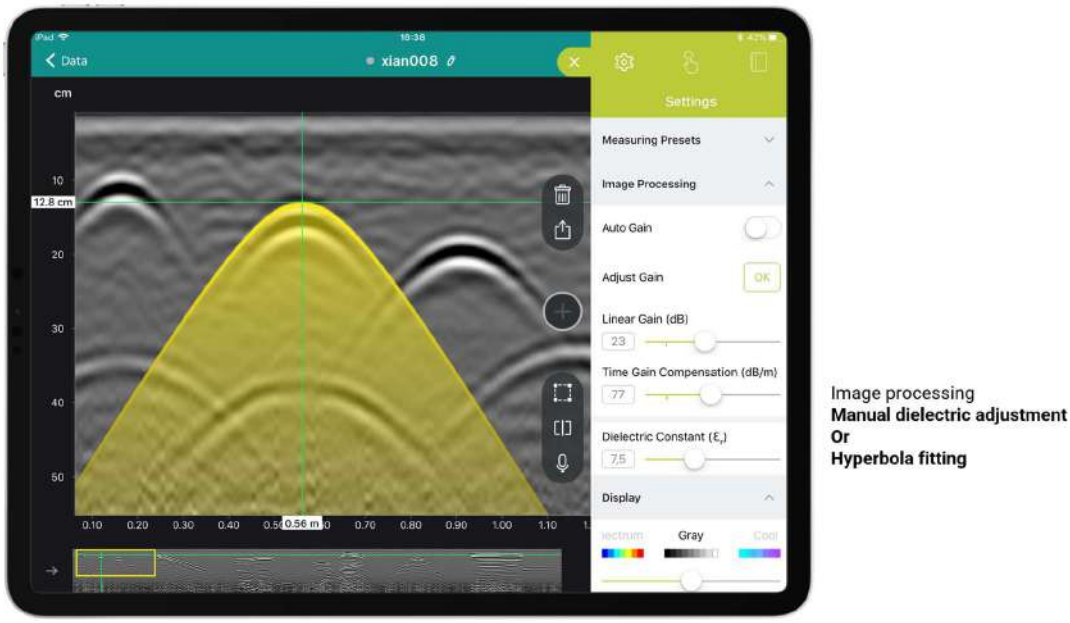



*Figure 32: GP app software image processing manual input or hyperbola fitting for estimation of Concrete dielectric ε*

### *5.6.4.3 Tag object set depth dielectric calibration*

When the concrete dielectric (ε) is unknown, but one object's depth (such as rebar) is precisely known from a cover meter or inspection hole then the dielectric can be calibrated by setting the depth of the object using a tag in "tag setting input depth as shown in Figure 33.

We recommend the use of cover meters such as Profometer PM8000 to precisely estimate the depth of rebar in shallow layers. Cover meter technology (eddy-current) is not influenced by the concrete dielectric.

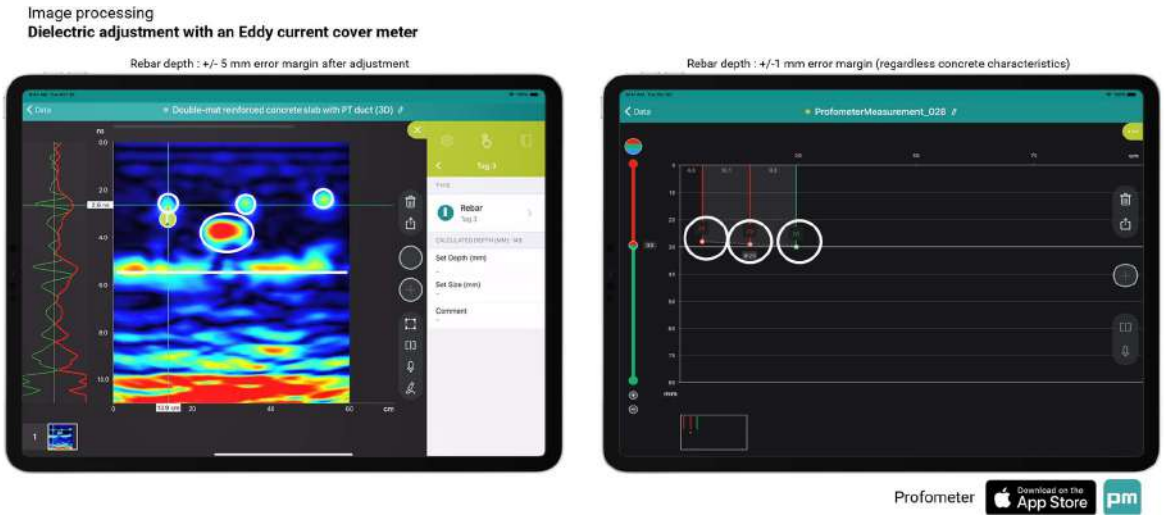



*Figure 33: GP app software tag object set depth for calibration of concrete dielectric (ε)*

### 5.6.5 Adjustable Time window (GP8000)

The time window is the time that the antenna's receiver spends for listening the GPR signals coming back from objects/reflectors in the concrete, as shown in Figure 34. Most handheld antennas have a fixed time window which does not allow for receiving deeper signals (provided an adequate range of low frequencies) or focusing on shallow layers.

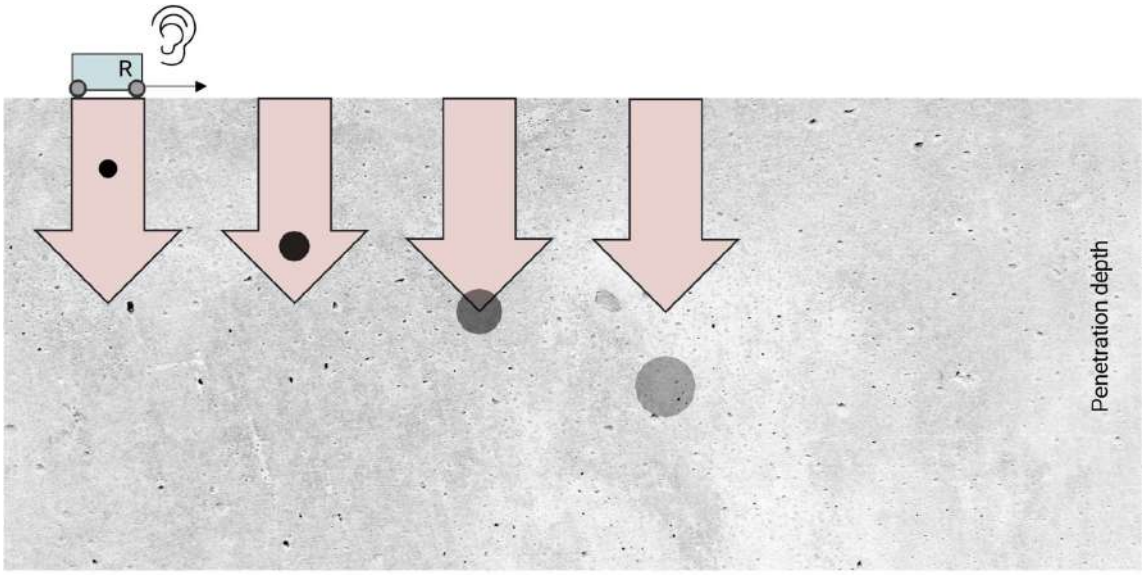



*Figure 34: Time window principle*

GP app software (only with GP8000) provides in the image processing dropdown menu: the "**depth/time window**" setting. By adjusting the time window from 10 ns (shallow) to 24 ns (deep), the user can either focus on shallow objects or extend the depth to the maximum (150cm / 60in penetration depth for standard concrete).

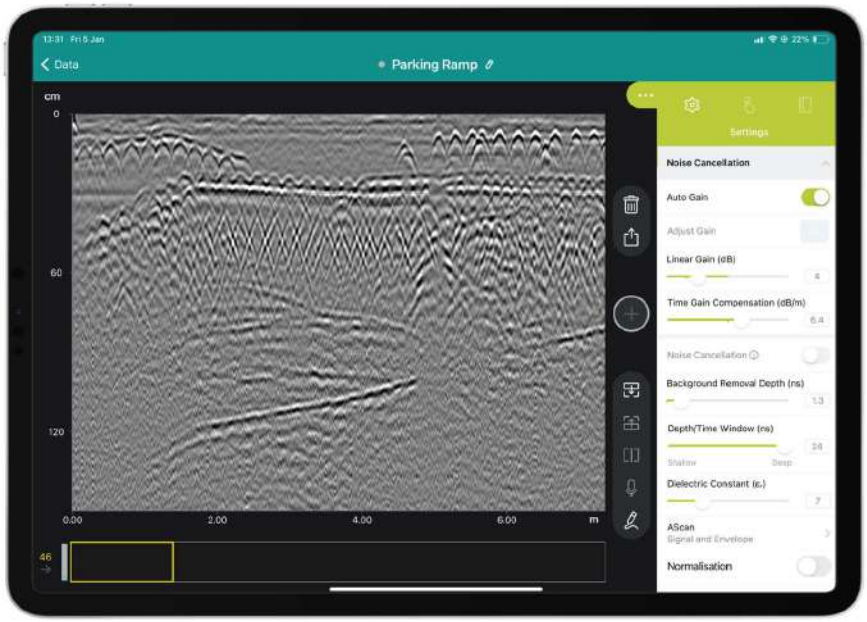



*Figure 35: GP app software image processing adjustable time window*

## 5.7 Display & preferences

### 5.7.1 Color setting

Display in dropdown menu provides a wide range of color settings for the different views.

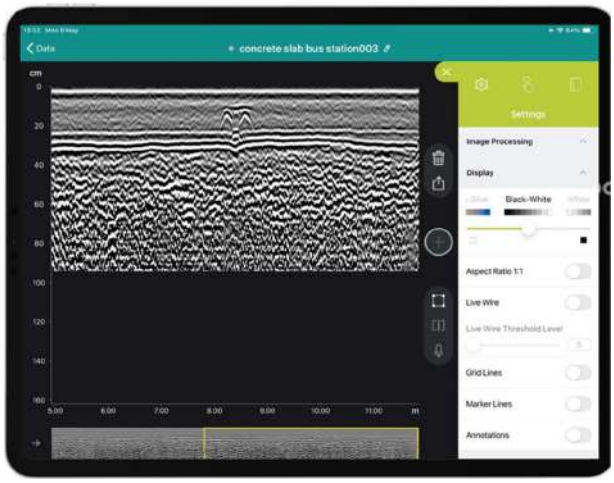
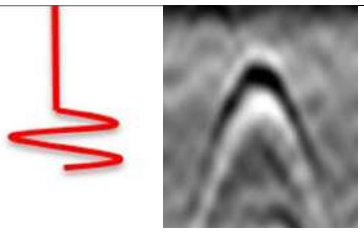
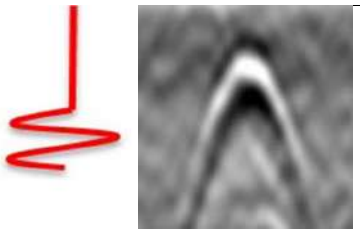
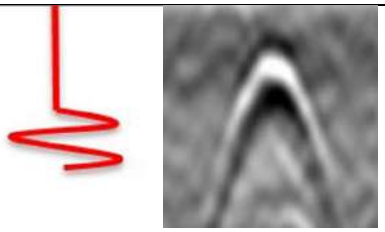
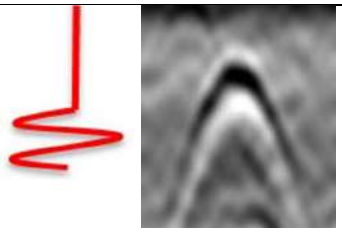



*Figure 36: GP app software color display setting*

By default, GP software raw data view is in “Black-white” color code. This means, where the A-scan amplitude is negative (typically a metal target in concrete), the B-scan generates a main centred black color at the rebar position. Conversely, where the A-scan amplitude is positive in concrete (typically air or plastic) the B-scan generates a main centred white color. However, be aware that the opposite is “White-black” color code setting!

| **Raw data view (B-scan)**<br><br>**Color display setting** | **Metal** or **water** target in concrete<br>A-scan with negative amplitude<br><br>From Concrete to Metal or water | **Plastic** or **air** target in concrete<br>A-scan with positive amplitude<br><br>From Concrete to Plastic or air |
|---|---|---|
| **Black-white**<br><br>**(<u>by default</u>)** |  <br>white-BLACK-white hyperbola |  <br>black-WHITE-black hyperbola |
| **White-black** |  <br>black-WHITE-black hyperbola |  <br>white-BLACK-white hyperbola |

### 5.7.2 Marking preference

GP software proposes two alternatives for setting markers in “**Marking with Probe Button**” setting in drop down menu.

- **Back Mark** : Marking by scanning backward
- **Forward Mark:** Marking by scanning forward

Read section 4.2.3 to know marking button functionality.

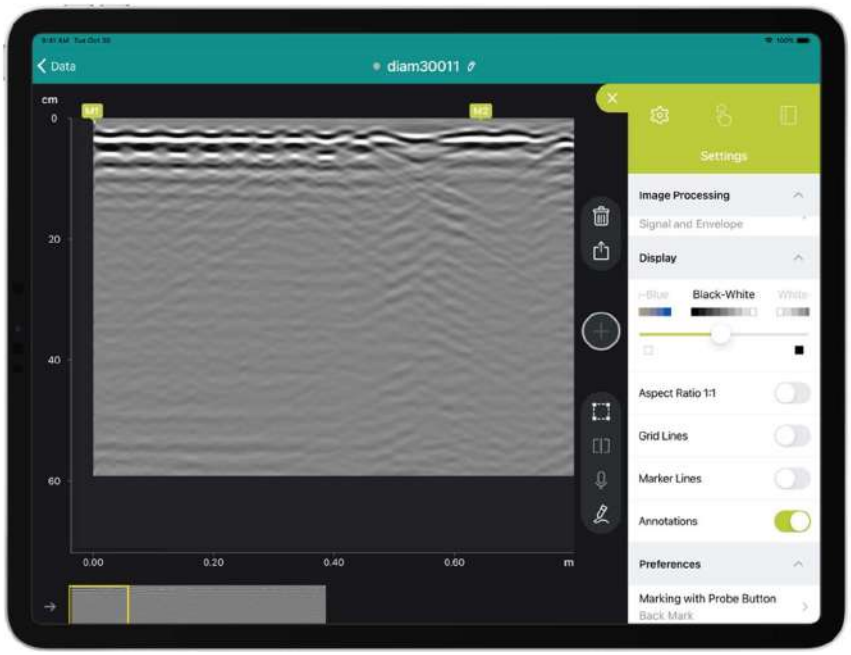



*Figure 37: GP app software Marking with Probe button setting*

## 5.8 Logbook & Workspace

GP app software provides a logbook in dropdown menu that collects automatically the following meta-data (see Figure 38):

- Sensor serial-number
- Software licence owner
- Geolocation
- Measurement setting changes

The user can also add the following information:

- Pictures of the site
- Relevant snap shot
- Text & voice notes

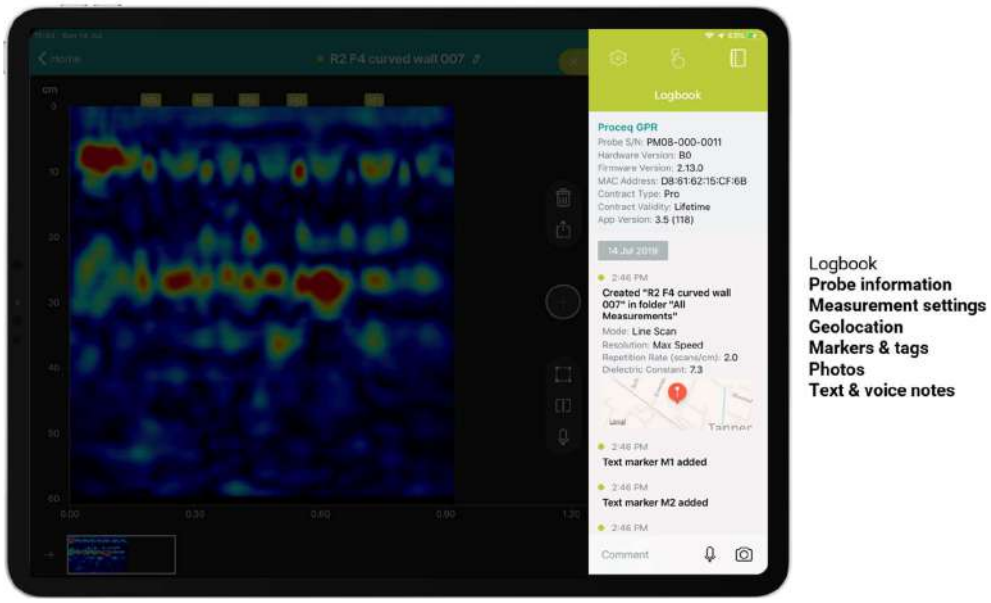



*Figure 38: GP app software logbook*

## 5.9 Data storage, reading, sharing & reporting

Screening Eagle Workspace is an online platform where all measurements are stored automatically as soon as there is data connectivity (Wifi or mobile network) allowing synchronization of the iPad. Reading and reporting (pdf printing of tab) is possible from anywhere at any time. The tabs provide all the screenshot views & logbook information. Sharing from workspace is possible with different formats such as SEGY or JPG.

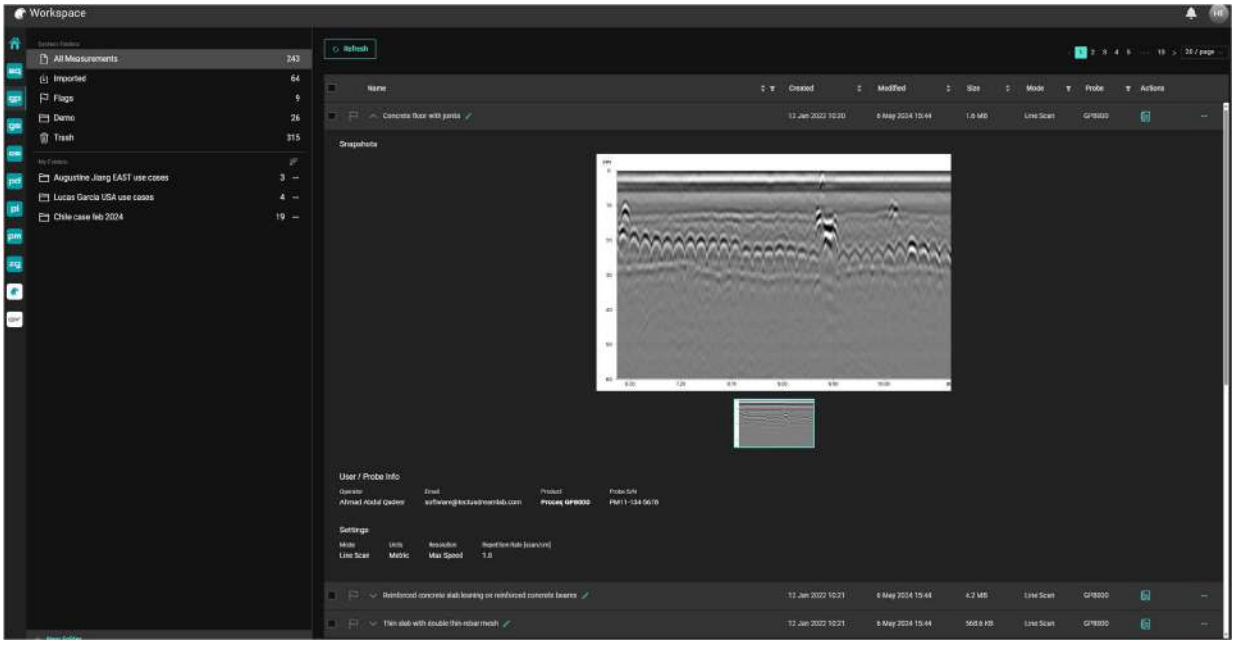



*Figure 39: Screening Eagle Workspace*

# 6 Applications

The different scan views provided in this section are for information & educational purposes only.

gp software is a powerful visualisation and image processing tool for easing the data interpretation. However, the data interpretation remains the responsibility of the user.

## 6.1 Concrete floor with joints

Measurement Mode: Line scan, perpendicularly to rebar & joints

The raw data and migrated views can locate and verify the irregular depth of top rebar and the position of different construction joints.

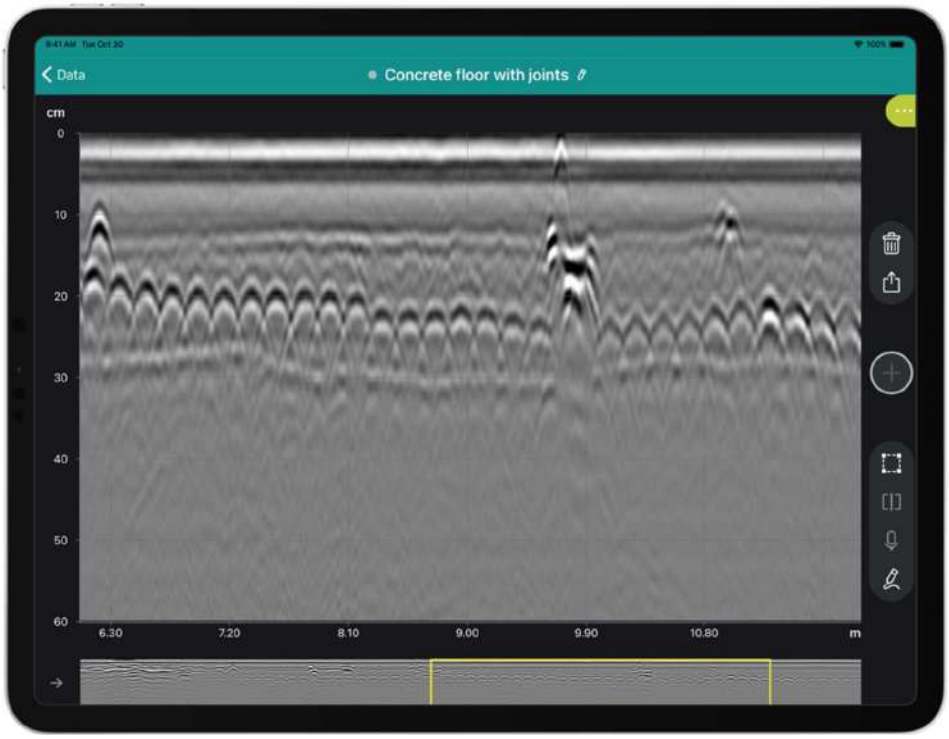



*Figure 40: GP app software migrated view concrete floor with joints application*

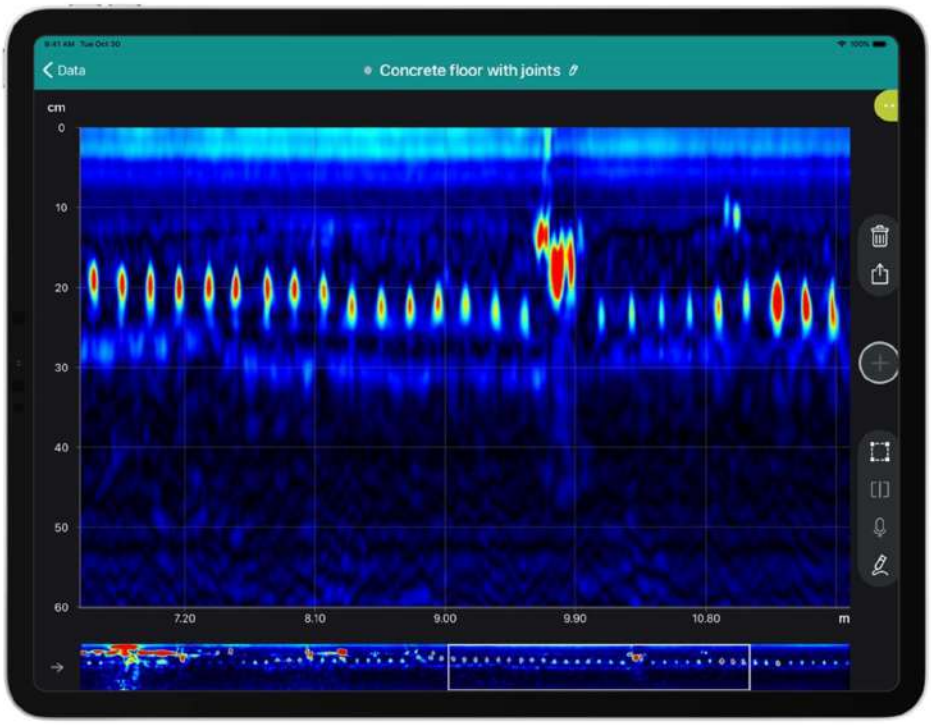



*Figure 41: GP app software migrated view concrete floor with joints application.*

## 6.2 Concrete slab with post-tensioned beam

Measurement Mode: Line scan with tags, perpendicular to beams

The raw data view shows top rebar and the PT beam bearing the slab.

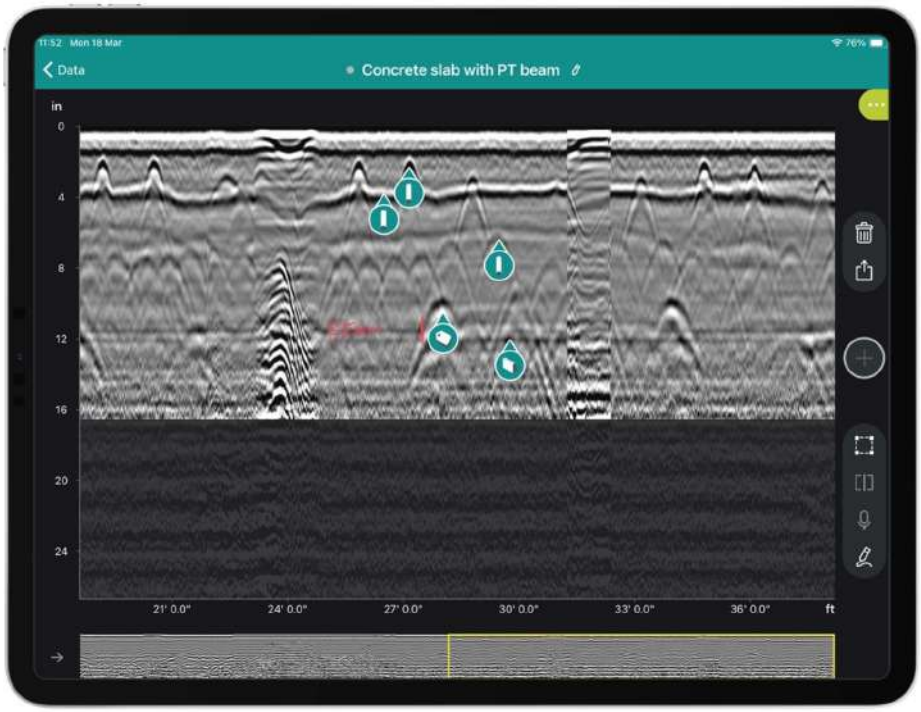



*Figure 42: GP app software raw data view concrete slab with PT beam application*

## 6.3 Hollow core concrete slab

Measurement Mode: Line scan with annotations, perpendicular to longitudinal hollow cores

The raw data view indicates the presence of hollow cores filled with air; the hyperbolas in black-WHITE-black suggests the presence of air in concrete (as explained in section 5.7).

Note that prestressed cable reflection inverts as the wave travels through air.

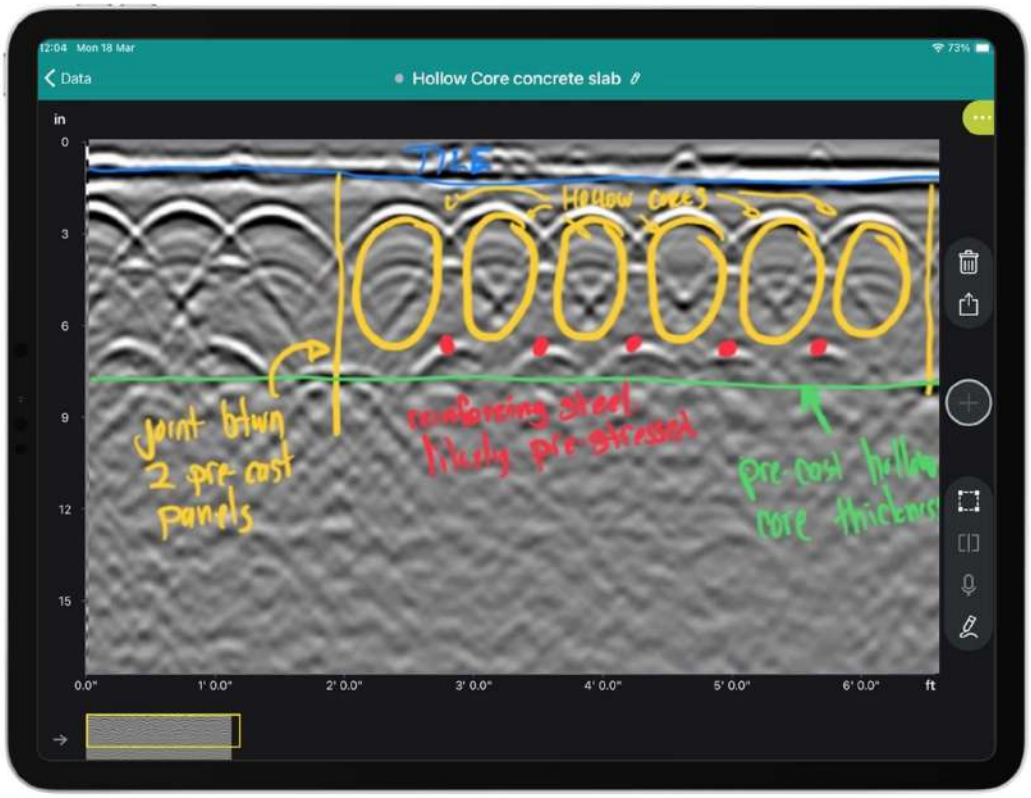



*Figure 43: GP app software raw data view hollow core concrete slab application*

## 6.4 Concrete slab with corrosion

Measurement Mode: Line scan with annotations, perpendicularly to top rebar

The raw data view indicates the presence of clean good signal targets but also low signal targets (see Figure 44). This can indicate the presence of corroded rebar.

Corroded rebar dissipates GPR waves and returns less energy than healthy steel rebar.

Proceq GPR helps to find out the potential presence of corroded rebar, however it is strongly recommended to use other tools & sensors such as GPR Insights post processing software or half-cell potential technology (Profometer PM8500) to strengthen the analysis. In any case, an inspection hole is necessary to confirm the presence of corrosion.

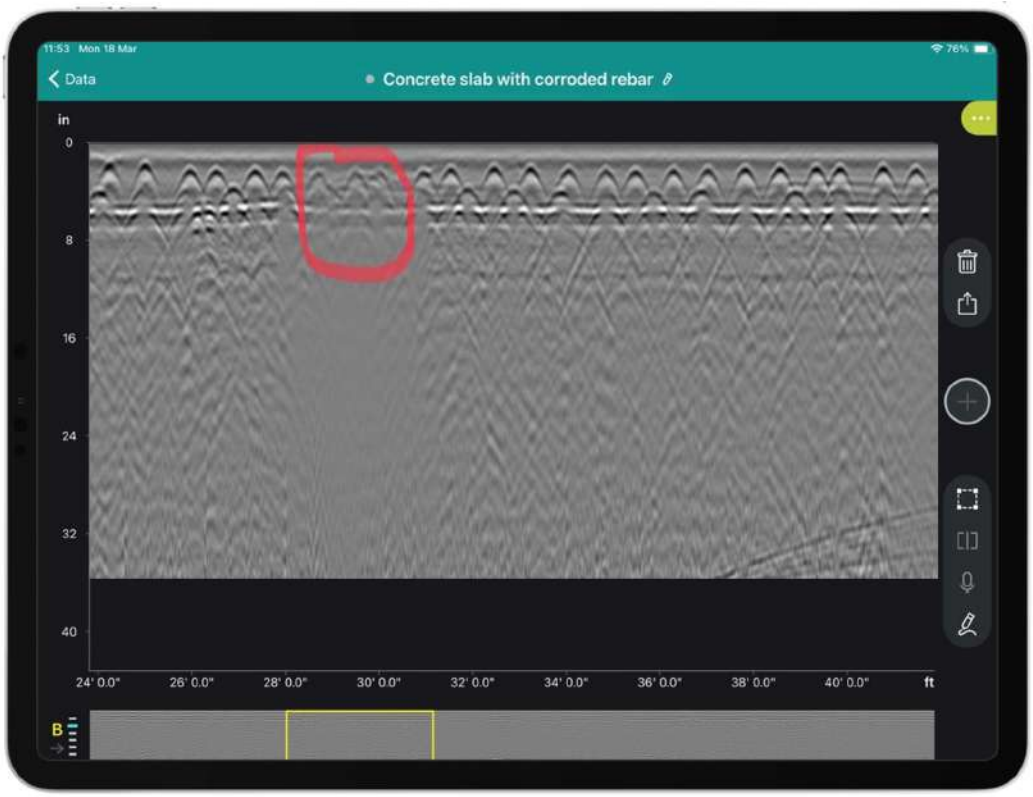



*Figure 44: GP app software raw data view concrete corrosion application*

## 6.5 Post-tensioned concrete slab

Measurement Mode: Area scan

The time slice view reveals at a certain depth all the PT duct layout and few rebar.

The B-scan and superline scan in split view confirm the presence of the PT ducts underneath the rebar.


*Figure 45: GP app software area scan PT concrete slab application*

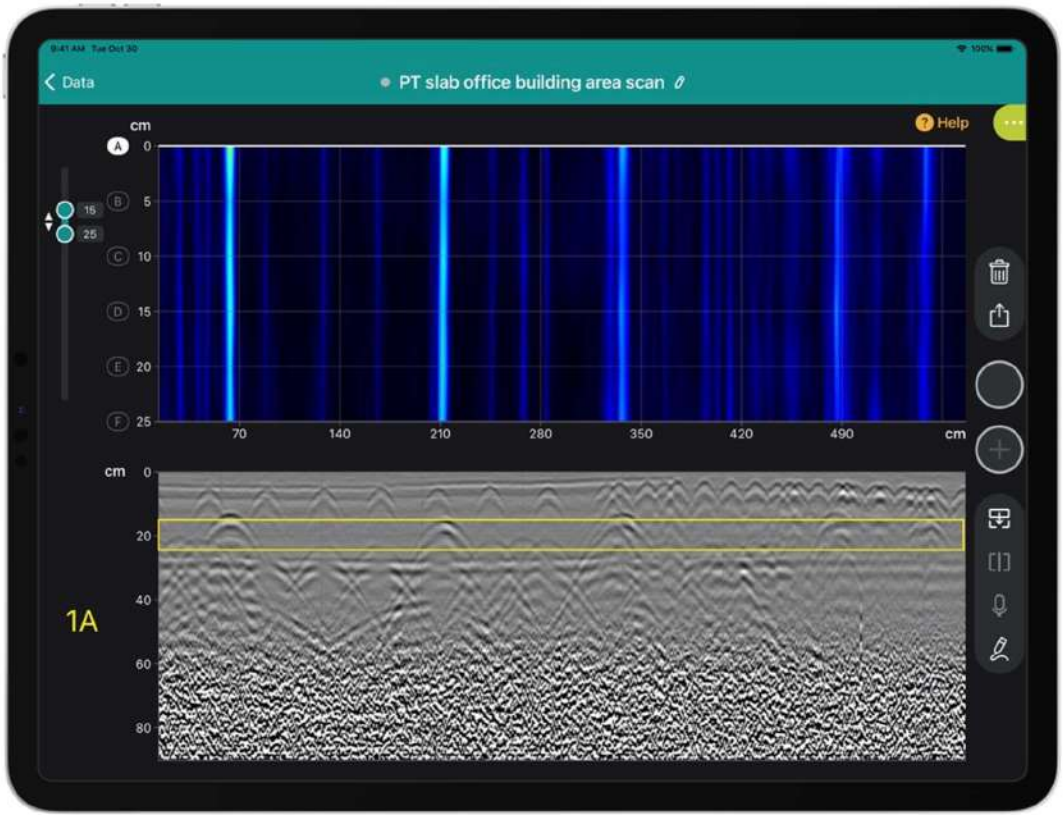



*Figure 46: GP app software raw data view PT concrete slab application*

# 7 Technical Specification

| | |
|---|---|
| **Measurement Principle** | Stepped-frequency continuous-wave (SFCW) GPR |
| **Regulations compliance** | CE, IC, FCC, UKCA and RoHS |
| **Connection** | Wi-Fi (802.11n) to display unit<br>USB-C for Wi-Fi restricted areas (GP8100 & GP8800) |
| **Warranty** | 2 years |
| **Operating Temperature** | 5°C to 40°C / 40°F to 105°F |
| **Storage Temperature** | -10°C to +60°C / 15°F to 140°F |
| **Relative humidity** | up to 85 %, non condensing |
| **Protection against water and dust** | IP 54 |
| **Depth accuracy** | ± 5 mm / 0.2 in (upon direct dielectric calibration!) |
| **Distance accuracy** | <2% error on distance |
| **Distance accuracy between objects (like rebars)** | **GP8000 or GP8100:** 4 cm / 1.6 in<br>**GP8800:** 3cm / 1.2 in<br>**Note:** for objects' depth at 5 cm / 2 in |


The English version of the content remains the official version. All translated content should bear an appropriate notice to this effect.

For safety and liability information, please download at

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