



Excellent  
Performance  
since 1989

# Concrete Structure Scanning E-Book

Utility Survey Corp.



# Contents

## Terminology/Equipment

Concrete Structure Scanning

3, 4

GPR is Preferred Choice Over X-Ray, Why?

5 - 7

Ground Penetrating Radar (GPR)

8, 9

Antennas

10, 11

## Benefits

Safety

13

Confidence

14

Profitability

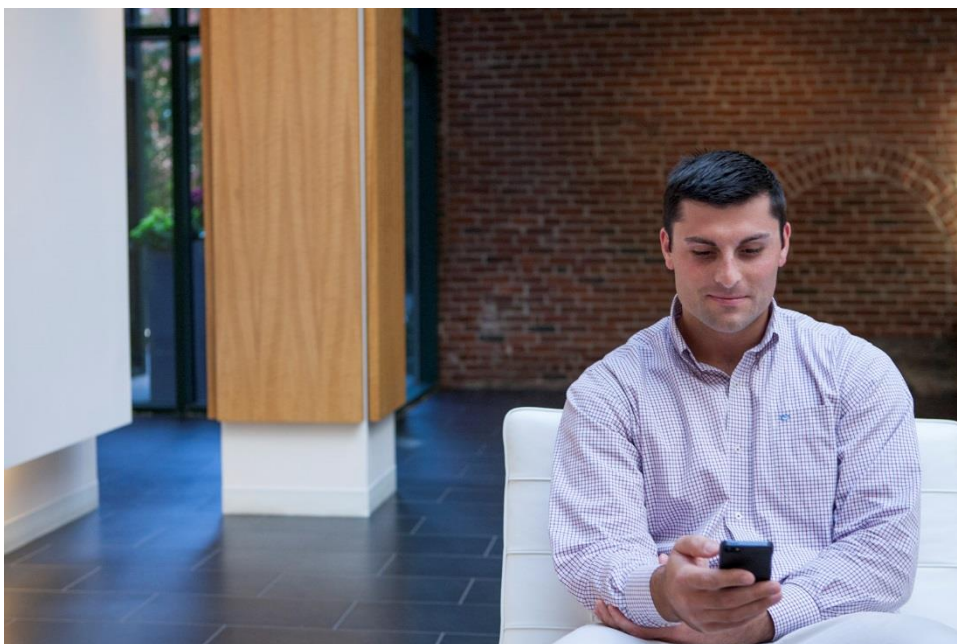
15

Peace of Mind

16

## Case Study

17



# Concrete Structure Scanning

“Concrete Structure Scanning” is a very general description...

It is probably the most commonly used term but there are also several others – which can be confusing.

“X-raying” is what prospective clients typically confuse with Ground Penetrating Radar (GPR).



The following will explain these terms and help you be clear about what you can expect when asking for a concrete structure scanning survey before your next saw cutting, coring or boring project.



*Concrete Structure Scanning is the method of accurately determining the whereabouts of utilities, post-tension cables, objects or features buried inside and under concrete structures.*

Concrete structure scanning requires the use of technology specifically designed for the purpose. It must be operated by qualified technicians following strict scanning protocols.

Our unique and proprietary "10-Step Concrete Structure Scanning Protocol™" incorporates the use of the following primary investigative technology:

- ✓ Ground Penetrating Radar (GPR)
- ✓ Electro-Magnetic/Radio-Frequency Locators (EM/RF)
- ✓ Cable Avoidance Technology (C.A.T.)

The concrete scanning technician will mark the position of all detected utilities, post-tension cables, objects, and features on the surface of the slab with color-coded paint or chalk.

The choice of a marking medium will depend on the job-site conditions (i.e. paint for the marks if some degree of permanence is required, or, chalk if for aesthetic reasons marks are not permitted to remain in place).

The color – codes must conform to industry standards as seen here.



# Why GPR is the Preferred Choice over X-Ray for Concrete Structure Scanning

Utility Survey Corp. has been in the [utility locating](#) business for over 20 years and we're often asked if we use X-ray to look for conduits, rebar etc. inside of concrete slabs? The answer is always; No, we have a better option for you; Ground Penetrating Radar (GPR).



Only GPR will provide our clients with a safer, more efficient, and lower-cost way to achieve their objectives. In most cases it is the only technology that can do the job.

[Ground Penetrating Radar](#) is the only real choice for pretty much any concrete slab scanning application where there's a need to find rebar, mesh, conduits, post-tension cable, voids, delamination, slab-thickness etc.

And here's why:

GPR only needs access to one side of the slab whereas X-ray needs both sides - and this is impossible in most applications. For example, slabs-on-grade cannot be scanned with X-ray but they're routine and perfect for GPR.

X-ray generates harmful radio waves, GPR does not. The benefits of this are obvious; there's no potential danger to our technicians or our clients with GPR and it requires no elaborate and cumbersome Personal Protection Equipment (PPE) to be worn.

No designated safe area is necessary with GPR but a clear zone of around 100 feet in all directions away from the work area is needed for X-ray. This means that a great deal of unwanted, unnecessary, and most times unacceptable, disruption and/or shut-down of the client's workplace is avoided with GPR.



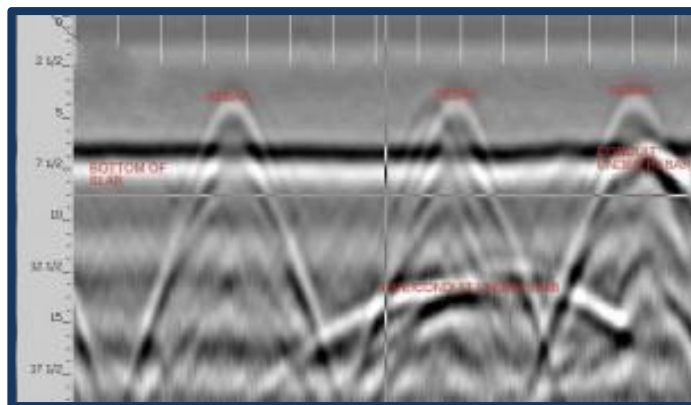
The latest Ground Penetrating Radar systems that we use are very compact, highly portable, and can access areas of a job site that X-ray cannot. Many of our clients need to drill, core or bore through slabs in out-of-the way, discrete places. Inside of a closet to run pipes through the slab seems to be a favorite, for example. Scanning and marking a clear path for these pipes can only be done with our hand-held, Palm antenna GPR systems.

Many of our clients want to know if there is anything lying underneath concrete slabs in addition to what may be inside of them. With rapid interchangeable antenna capability, our GPR systems are an excellent tool for this.

GPR also gives us on-site, on-screen, imaging which X-ray does not. The GPR units are even equipped with an odometer which enables the technician to back up over a target for another look and evaluation in real time. Impossible with X-ray.

Last but not least, GPR is a far more cost-effective option than X-ray. GPR requires almost no setup time. Time that the client is paying for and which is better spent doing the important work. No costly off-site data processing is needed with GPR. Information is provided immediately and marked on the slab. This allows clients to do their work without delay providing for efficiency and further cost savings.

Ground Penetrating Radar (GPR) provides a safer, lower cost, more versatile, option for scanning concrete structures than X-ray.



[Call Utility Survey Corp.](#) when you need to know what's inside of, or on the other side of, that concrete floor, wall or ceiling. Let us tell you where it's safe to saw-cut, drill, core or bore.





## *Ground Penetrating Radar (GPR)*

Ground Penetrating Radar (GPR) is a proven technology for concrete structure investigations where there is a need to identify electrical conduits, rebar, mesh, I-Beams, post-tension cables, voids, delamination, slab thickness, etc.

Ground Penetrating Radar is the only locating technology that has the ability to “look” into, through, and below the concrete slabs.

Utility Survey Corp. uses the latest portable GPR systems with antenna configurations optimized for both ground and concrete scanning. Both the cart and portable GPR systems display a target’s information on an integrated computer in real time showing horizontal position and depth.



Ground Penetrating Radar (GPR) successfully detects metal-based utilities but its wider application is for non-metallic ones such as plastic gas and water pipes, fiberglass USTs, and hollow voids etc.

There are two types of Ground Penetrating Radar systems used in utility locating:

i) a cart-based design for finding utilities, objects, and features buried under the ground, and,

ii) a portable hand-held design for finding utilities, rebar, post-tension cables, and voids concealed inside concrete structures.

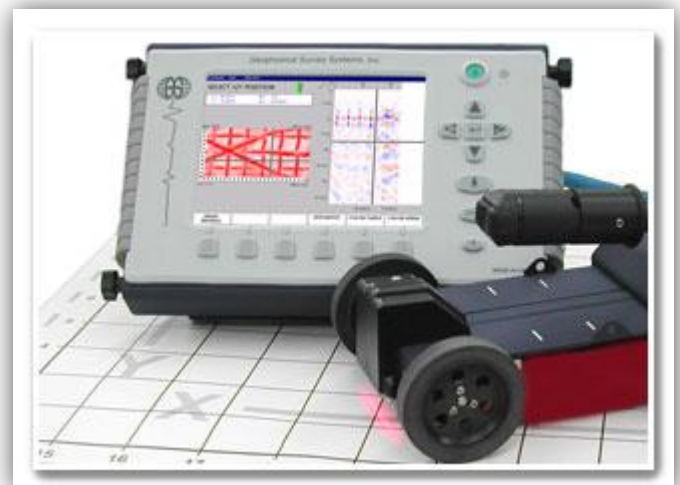
The GPR antenna sends a radio signal into the ground or concrete structure which then bounces off any target it detects. The signal reflects off any target it encounters and is received back at the antenna for processing.

---

For concrete structure scanning, our portable systems operate on frequencies of 1.0GHz, 1.6GHz, 2.6GHz, and a Palm Antenna of 2.0GHz.

We also have a very compact system for getting into tight corners with a frequency of 2GHz.

---



Scanning with the correct GPR system and most suitable high-resolution antenna frequency configuration is what's important and something the client should be clear about.

GPR is added protection and peace of mind. Equipping each of our service vehicles with its own GPR Concrete Structure Scanning System was an expensive process – but...

*Peace of Mind is Priceless.*

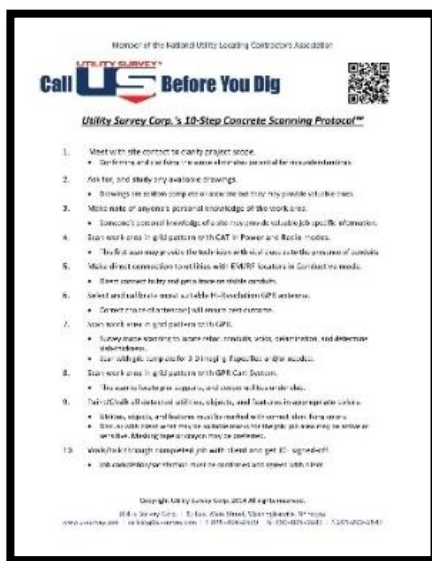
# GPR Antennas for Concrete Structure Scanning

Utility Survey Corp. owns and operates the most advanced GPR systems available for concrete structure scanning applications. They are highly-portable with multiple, interchangeable, quick-swap, antenna configurations.

Antenna interchangeability is a very important feature of our GPR units and what we consider a necessity to cover the many and varied jobs we get called to perform.

The antenna is really the brain of the GPR system. It transmits a radio signal at a set frequency that allows the technician to “see” into and/or through a concrete structure. However, there is no one antenna frequency that will cope with every situation. Some concrete slabs are thicker than others with differing methods of construction, etc.

To accommodate these variables the manufacturer produces a variety of antennas with operating frequencies of 1.0GHz, 1.6GHz, 2.6GHz, and a Palm Antenna of 2.0GHz.



Utility Survey Corp. carries this complete range of antennas to ensure our technicians are prepared for every eventuality. It is an essential part of our [\*"10-Step Concrete Structure Scanning Protocol™"\*](#)

# GPR Antennas for Concrete Structure Scanning

The 1.0GHz antenna is the lowest operating frequency and is typically used for “seeing” deeper into, and just below, the concrete. The 1.6GHz antenna is more of the general purpose and more widely used unit for most jobs where the slab is of average design thickness. The 2.6GHz antenna is on the highest operating frequency. It typically won’t “see” as deep as the 1.0GHz and 1.6GHz but is particularly useful for scanning for smaller targets close to the surface of the concrete.



The 2.0GHz Palm Antenna is a very compact, special purpose unit. We use it for scanning in very confined spaces not accessible with the other three antennas, such as inside of closets for example.

In addition to our concrete scanning systems, we always show up to concrete jobs with our GPR Cart systems. These are part of our outside utility locating arsenal and operate on frequencies of 250MHz, 270MHz, or 500MHz.

Many of our clients also want to know what lies below the concrete slab as well as what’s inside so we use the lower frequency cart systems for this. They will “look” right through the slab and into the ground below to find any utilities situated there.

With our full range of GPR antennas we are equipped and prepared to cope with the many challenges involved with scanning concrete structures.



---

# Benefits of Concrete Structure Scanning with GPR

# SAFETY

Minimizing risk and avoiding accidents on construction sites should always be a requirement and never an option. A concrete structure scanning survey is your best tool in minimizing and eliminating your risk. We are confident, based on feedback from our many long-term customers, that this is a level of assurance no other concrete structure scanning company can provide.



We realize the severity of the risk you take on each job. Our [\*"10-Step Concrete Structure Scanning Protocol™"\*](#) will provide you an extra level of comfort that every precaution has been covered before you saw-cut, core, or drill.



*Why take the chance?*

**“We will clear the way so that your work may proceed with confidence.”**

You should never saw-cut, core, or drill, wondering if you’re going to run into any unexpected utilities or other hazards. Damaging a utility or post-tension cable can have potentially costly and/or fatal consequences.



Before any of your construction activities take place we will find and mark those hidden dangers that can more than ruin your day.



# PROFITABILITY



*"Incident prevention is so much more cost effective than any cure."*

Hitting a buried utility or post-tension cable can be costly and damaging to both people and property.

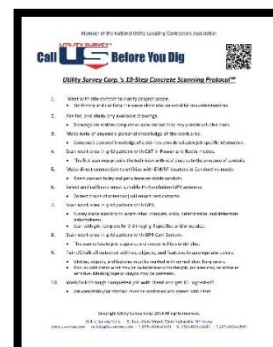
It can seriously affect the **profitability** of your job. Even the smallest of incidents can cost big money in unplanned for and expensive emergency repairs.

Even if no utilities get damaged, unexpectedly running into any utility that no one knew was there may bring your project to a grinding halt anyway.

A re-design may be necessary, manpower and machinery will be idle, and a solution will have to be found.

*There are just so many unanticipated factors that can affect your bottom line!*

Planning ahead to have Utility Survey Corp. locate and mark all utilities with our [10-Step Concrete Structure Scanning Protocol™](#) before you saw-cut, core, or drill, makes for a sound investment.



**AN INVESTMENT  
WORTH MAKING**



Imagine if there was a process that could significantly reduce your risk and that came with an investment of as little as a fraction of 1% of the project budget.

**You have just discovered it!  
Concrete Structure Scanning with GPR!**



***"We never compromise quality to get the sale."***

A quality concrete structure scanning service that you and your client can trust requires a methodical and systematic approach.

Our ["10-Step Concrete Structure Scanning Protocol™"](#) is optimized to give you this. We think you will agree, that the most rewarding and productive relationships are based on trust and not on transactions.

---

## Concrete Structure Scanning Case Study

A long-time Utility Survey Corp. client called us to a county prison in New Jersey to help solve a problem for a general contractor client of theirs.

While installing a new security door, the contractor discovered that portions of the block wall had not been grouted properly. The questions was then raised as to whether this was an isolated section, or, was the entire wall compromised? The wall was in a high security area and any weakness in the structure posed a serious security risk. It had to be investigated.

Utility Survey Corp. was asked to bring out our portable, very high resolution, Ground Penetrating Radar (GPR) Concrete Scanning systems to determine if any additional sections of the wall were also improperly grouted.

The results were very revealing. The GPR could "see" where gaps in the grouting appeared to be. For additional confirmation, our client was able to insert a fluoroscope camera into the suspect areas and confirm the GPR's findings.

Furthermore, the prison authorities then wanted to know why was the grouting incomplete in some areas and not in others? Why was the wall compromised in this way? We were able to provide the answer to this question too. It was essentially carelessness during the original construction. Empty soda cans had been tossed inside the blocking which had then prevented grout from filling those sections of wall and also all sections directly below.

Our Concrete Structure Scanning GPR Survey successfully identified all the problem areas for the client. This ultimately produced a tremendous cost saving as a remediation/repair plan was able to be implemented as opposed to taking down and rebuilding the entire wall.

*We Give You the Ability  
to "Proceed with Confidence"*