Matt Aston—President of GPRS (left) &
Ryan Hacker—President of TruePoint (right)

EMERGING TECHNOLOGIES

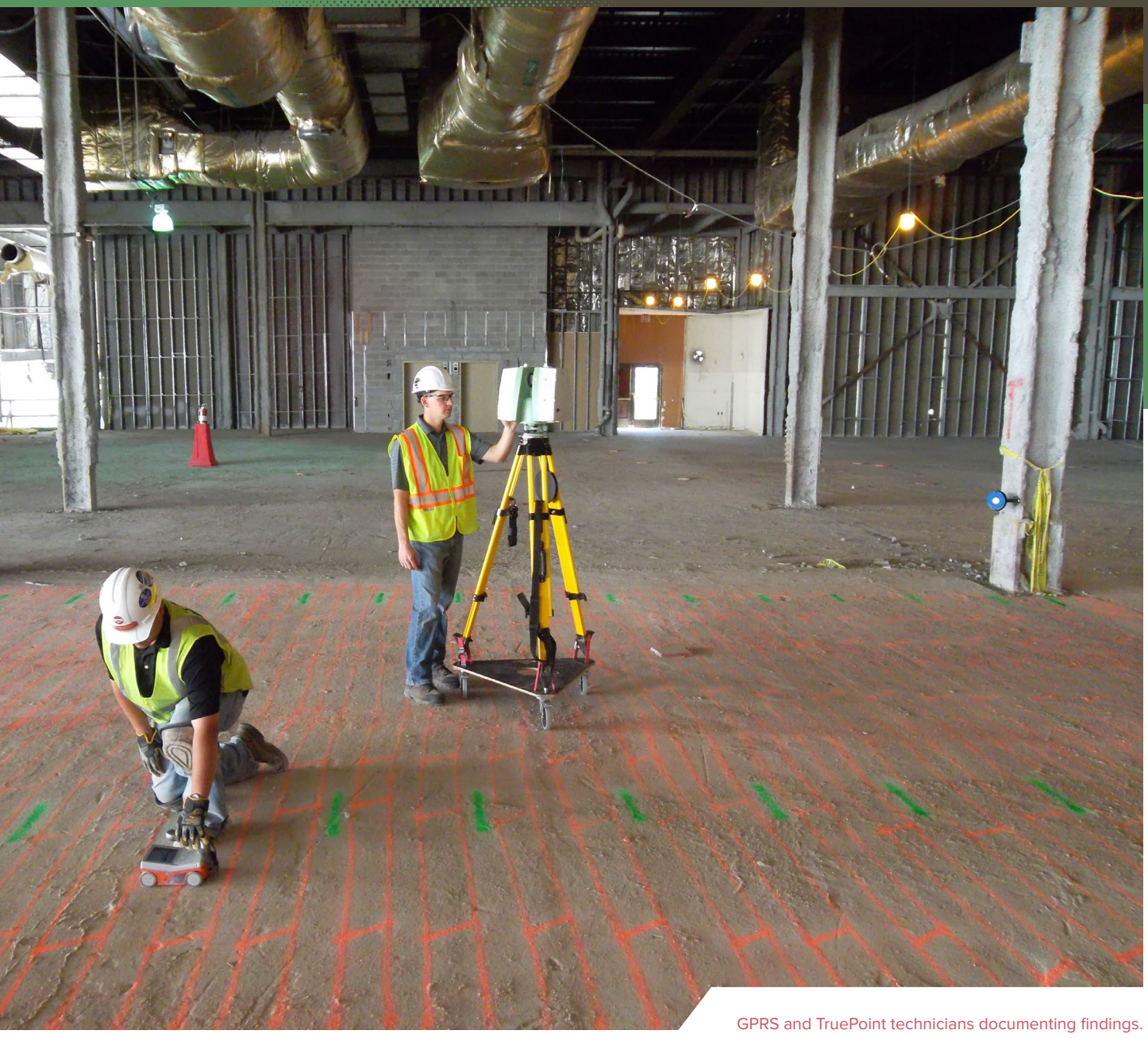
Provide a More Complete Understanding of a Site

TruePoint Laser Scanning, LLC., a 3D laser scanning company that uses LiDAR and phased-based technology, and Ground Penetrating Radar Systems, Inc. (GPRS), a provider of concrete scanning and underground utility locating services, are sister companies that began teaming up in 2011 in order to tie their respective technologies together for the benefit of their clients, accentuating both companies' passion for a high level of customer service.

TruePoint Laser Scanning, LLC. combines state-of-the-art equipment and software with its expertise to provide its clients with quality 3D laser scanning services. TruePoint aims to capture the data efficiently and accurately, analyze it, and define the results in whatever way will best meet the needs of its clients.

Utilizing 3D laser scanners, TruePoint is able to provide high detail and accurate as-is condition deliverables serving a number of industries including: hospitals, universities, refineries, municipalities, energy manufacturing plants, and waste water treatment facilities. The data collected from laser scanning can provide information on support analysis, design, and

BY RYAN **HACKER** & MATT **ASTON**

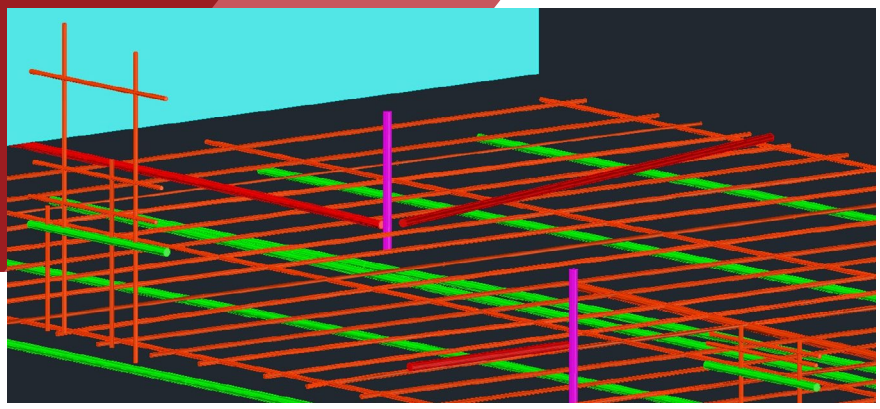


GPRS and TruePoint technicians documenting findings.

prefabrication. There are numerous benefits to laser scanning, including accuracy and efficiency, but it can also be a safer method of capturing this vital information since the technicians can do most of their scanning safely from the ground and at a distance from hazards.

Similarly, GPRS uses the latest ground penetrating technology to provide its clients with essential information, both underground and "in" concrete structures. The information is collected quickly, reliably, and safely. Since 2001, GPRS has provided ground penetrating radar services to both commercial and residential clients. The technology of GPR uses an electromagnetic pulse to determine the reflective values of objects in concrete or underground—a simple send/receive technology. The radar sends an electromagnetic pulse from the surface, and the reflections are received back at the surface. Thus, the radar only needs access to one side of the concrete, allowing for numerous applications of the technology.

As with TruePoint's laser technology, GPR is a safe technology. There is no concern for health risks for the technicians, employees, or tenants in a building. Since the radar operates almost silently, there is no noise disruption at the work site and radar does not create a radiation concern like x-ray does. GPRS uses registered equipment that meets all standard FCC regulations. The use of ground penetrating radar can reduce risk and cost for a client, in addition to promoting a safe work environment



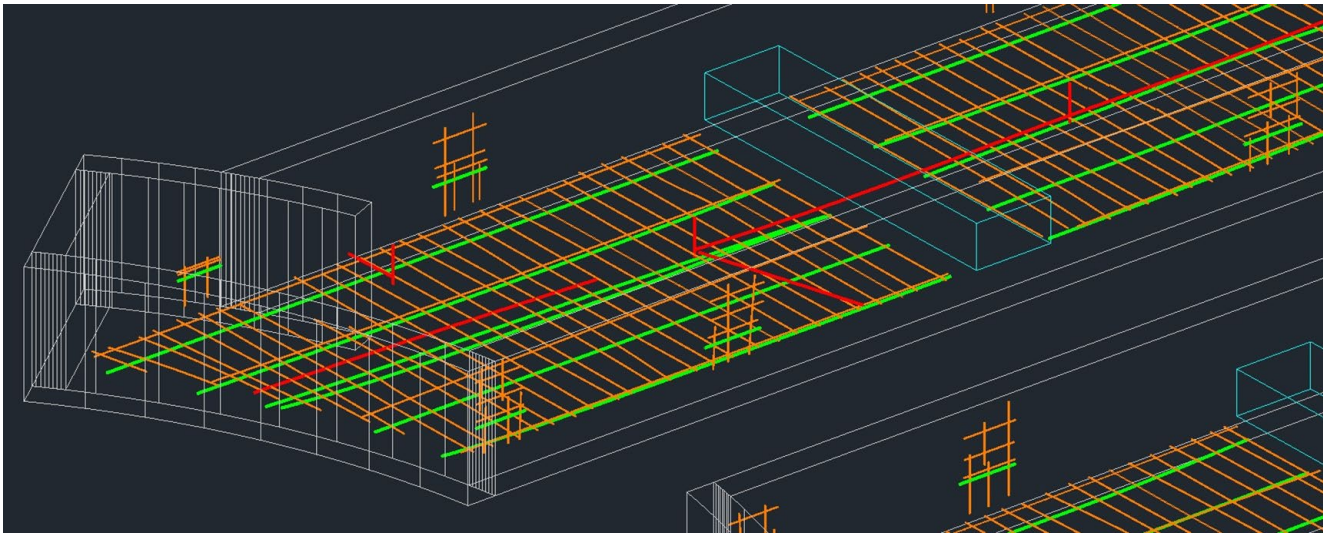
Detailed view of rebar (orange), post-tension cable (green) and electrical conduit (red & purple) in 3D Model

since it provides non-destructive testing for locating materials. Like TruePoint, GPRS also has a wide client base, ranging from homeowners to hospitals and universities, as well as environmental firms and contractors.

While both companies use precise and efficient technologies, their abilities differ slightly. Laser scanning, which TruePoint uses, is limited to line of sight. GPRS, though, can see underground or into concrete. Using radar, GPRS can locate steel rebar, post-tension cabling, electrical conduit, utilities, and other obstructions both underground and in concrete. Tying these two technologies together gives the teams, as well as their clients, a more complete and comprehensive look at a site. This pairing is ideal for projects that require locating underground utilities or items embedded in concrete and then documenting these findings in a CAD format tied to their surrounding environment, which can be used for the planning stage of a construction project or future use. Both TruePoint and GPRS use technology that is quick and cost effective, saving clients both time and money.

In one such example, TruePoint Laser Scanning and GPRS combined their technologies and skills in order to create a permanent record of the locations of rebar, post-tension cabling, and electrical conduit in the concrete deck of a parking garage structure. The findings were then documented in a 3D CAD model. Typically, GPRS marks their findings directly on the surface in real time so that the client can begin cutting or drilling. However, sometimes clients request to have this information permanently recorded in a useable and accurate format, typically so it can be used for design or to reference in the future.

By combining both GPRS's radar technology with TruePoint's laser scanning technology, the two company's teams were able to document the markings of the parking garage in a 3D CAD model (examples below), creating



3D CAD model showing rebar, post-tension cabling and electrical conduit in relation to the surrounding structure

Colorized Point Cloud capturing GPRS's findings & the surrounding environment

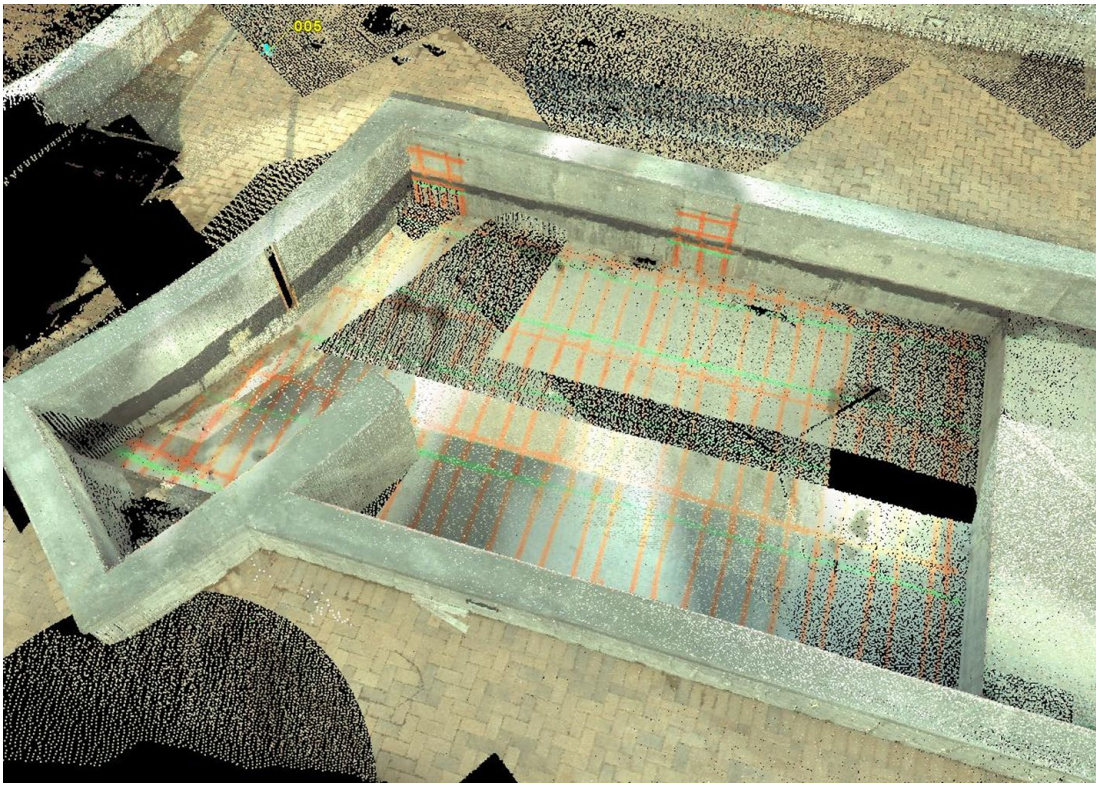
a permanent record of the rebar, post-tension cabling, and electrical conduit locations in and under the concrete of the structure. GPRS located and marked their findings directly on the concrete, while TruePoint's technicians followed behind with their laser scanner.

Not only did TruePoint create a 3D CAD model showing the locations of the findings, but it also was able to capture the details of the surrounding columns, walls, floor, and ceiling, which was then aligned to the client's existing model, giving the client a permanent record which can be used at any time in the future to accurately locate and measure any points in the structure.

Laser scanning is precise and efficient and having GPRS's findings permanently recorded gives the client the ability to have a working model of their facility, with detailed locations and elevations of underground piping or other buried objects in the structure. The added benefit of having the information available in the form of a point cloud or a 3D Model is that not only does the client have the information, but the engineers, architects, and others involved in the project also can have access to the information and are able to overlay this data into their own software in order to assist with both the planning and implementation phases of a project.

> "Tying these two technologies together gives the teams, as well as their clients, a more complete and comprehensive look at a site."

Another client, in Detroit, Michigan, was in the pre-planning phase of a renovation project and needed to layout their anchor points. The client realized that they would be likely to hit rebar and post-tension cables within the concrete floor, so they wanted to be able to plan ahead in order to minimize the number of hits. GPRS was brought in to use their radar to map out what was within the concrete floor. As with the parking structure case, GPRS marked its findings directly on the surface of the concrete. Transferring these markings manually into a CAD model would have been a slow, tedious, and not particularly precise process. Additionally, it would have still required



Colorized point cloud showing GPRS findings and the existing building structure

post-field manipulation after the data was collected to get it into a CAD file.

In this case, though, TruePoint once again followed behind GPRS in the process and, not only captured the necessary GPRS markings and the surrounding building structure, but it was also able to tie all of the information to the building's coordinate system, giving the client the ability to know the exact location of any marking within the structure's coordinates. The 3D model that TruePoint provided the client allowed the engineers on the project to import it into CAD to lay out their coring plan.

TruePoint provided the Michigan client with a 3D CAD model which included the point cloud of the building structure and polylines detailing GPRS's findings. In addition, a TruView was provided to the client, which consists of 3D photographs overlaid on top of the point cloud that allows a user to move around the photograph and take rudimentary measurements if needed. By combining the services of both TruePoint Laser Scanning and GPRS, the client was able to avoid costly design changes as well as the costs associated with repairs for hitting too many post-tension cables or rebar embedded in the concrete.

Combining the skills of TruePoint and GPRS can prove especially useful for many projects. And since both companies value customer service, they look at this pairing as a way of enhancing the individual benefits for their clients, giving them additional useful information. If a client needs to scan for rebar and post-tension cables embedded in a structure or underground utilities and have the GPR findings permanently documented into a 2D or 3D CAD model to be used for either planning or construction, this pairing of the sister companies is invaluable.

Photos, videos and job stories of Laser Scanning and Ground Penetrating Radar available on line at truepointscanning.com & gp-radar.com.

Matt Aston is the founder of Ground Penetrating Radar Systems, Inc. (GPRS) which he started in 2001. GPRS has technicians in every major city in the U.S.

Ryan Hacker is the President of TruePoint Laser Scanning, LLC. which was started in 2011. Ryan's background is in Business as well as Management Information Systems (computers in business).