GRAHAM AND HYDE
ARCHITECTS, INC.

Li-DAR and Point Cloud Technology

Laser Focused on Client Needs...

For Graham & Hyde Architects, successful projects begin with the gathering of accurate field information, which is then employed to create precise construction documents. According to a recent AIA survey, half of all architectural projects are renovations to existing buildings. This project type brings with it an increased field verification burden, but technological tools have effectively lightened this load for Graham & Hyde. By utilizing Li-DAR scanning technology to capture existing building conditions, Graham & Hyde has brought its commitment to precision and accuracy.

What is Li-DAR?

Light Detection & Ranging is a sensing method that uses a pulsed laser to measure ranges at various distances. A Li-DAR instrument consists of a laser, a scanner, & a GPS (global positioning system) receiver. Li-DAR is most often used in aviation to acquire data over broader areas.

There are two types of Li-DAR. Topographic Li-DAR typically uses a near-infrared laser to map land. Bathymetric Li-DAR uses water-penetrating green light to measure seafloor and river elevations. The Li-DAR tool allows professionals to examine environments with accuracy, precision, and flexibility. Graham & Hyde utilizes the Topographic Li-DAR.

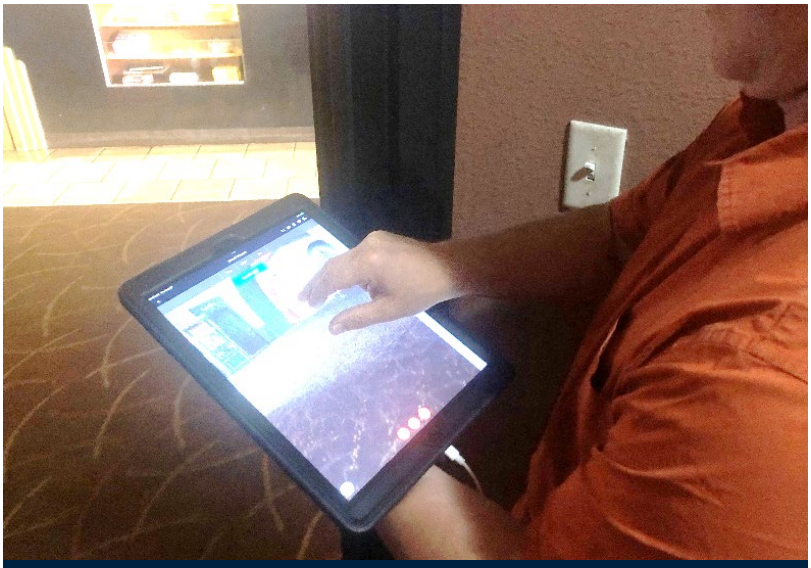
The Benefits of Accuracy

Li-DAR can measure slopes, quantify curves & determine angles, allowing G&H a degree of precision unmatched by a tape measure and traditional surveying methods. The accuracy achieved allows us to identify potential issues with a building that impact a design and ultimately project costs.

The data from Li-DAR scans can be integrated seamlessly with many of the digital tools that Graham & Hyde already employs. Not every project requires 3D scanning. However, in spaces where the original plans are not available and existing conditions are complex, leveraging Li-DAR technology becomes invaluable, allowing Graham & Hyde to put laser focus on meeting client

"How can we measure a building from the early 1900s with multiple additions and irregular features? Out-of-plumb walls, skewed angles, and varying elevations make conventional measurement methods difficult. Our Li-DAR system solves these issues in minutes."

– Vince Fournier, G&H Senior Technician



The Explosion Near St. Mary Catholic Church

After St. Mary Catholic Church (built in 1912) was shaken by a nearby gas explosion, it underwent a drastic interior renovation the following Fall.

A few weeks before the initial tragedy, in a grand display of providence, a consultant completed a 3D Li-DAR scanning demonstration for G&H, using the interior & exterior of St. Mary Catholic Church as his subject. Even more fortunate, these scans would be critical to the renovation, as original construction documents no longer existed.

The 3D point clouds were utilized to generate floor plans, as well as accurately recreate plaster details, wood shapes, and intricate ceiling moldings. With this project, technology and tradition intertwined, breathing new life into the architectural beauty that is St. Mary Catholic Church, Canton.

From this project on, G&H was sold on the benefit of 3D point cloud technology. Reconstruction documentation was precise due to the exacting tool.

How does Li-DAR work?

A laser is directed at a target from a series of fixed locations, where its beam reflects off the surfaces it hits. A sensor captures this reflected light to determine the distance. This laser range data is integrated with position & orientation information from GPS. The outcome is a richly detailed collection of elevation points known as a "point cloud." Each point in the cloud has 3D coordinates (latitude, longitude, & height) corresponding to the location on the Earth's surface from where the laser was reflected.

When is Li-DAR used at G&H?

Li-DAR technology allows the team to create accurate models of existing buildings. A Li-DAR tool captures millions of data points in a matter of minutes. This significantly reduces the time required for traditional surveying and measuring methods.

EXAMPLE: If a client requests a re-design of a theater auditorium & does not have previous construction documents for G&H to rely on, Li-DAR measurements can be used. An auditorium has curved walls, sloping floors, & varied ceiling heights. Taking manual measurements of such a space would be time consuming and error prone. A Li-DAR scanner can capture millions of data points in a matter of minutes, reducing the time required & the inevitable inaccuracies that manual measuring would produce. The high-quality 3D model generated becomes the basis for subsequent drawings. Graham & Hyde also uses the point cloud to complete planning accurately, solve complex ADA concerns, and provide accurate measurements to partnering consultants.