Laser Scanning for Landscape Architecture

Within the AEC Industry, the landscape architect is typically responsible for the organizing and placement of buildings, recreational facilities, roads, grading, and planting design within the context of a project’s natural and built surroundings. While both laser scanning and 3D modeling have the potential to be extremely useful during this design process, laser scanning can specifically benefit landscape architects. For example, laser scanning was used effectively for:

- Capturing point cloud data for planning analysis, visioning, and design for renovations of a college campus area. The data was used to generate viewpoints and animations to aid in site analysis, developing design ideas and renderings.
- Survey of a 2-lane bridge spanning a creek in a downtown historic district, for design of the replacement structure. Scan data was used to document the deteriorated bridge structure's conditions and surrounding topography.
- Survey for design of roadway improvements and access connections related to a major land development project. Scan data was used to develop existing conditions and cross sections for roadway design. This approach was particularly helpful in providing highly accurate topography needed for the detailed design of ingress and egress connection points.
- Topographic survey of a large and irregularly-shaped soil stockpile, for determining earthwork quantities. Scan data was utilized with AutoCAD Civil 3D software to perform volume analysis to develop bid quantities.

On each of these projects, the information provided from the laser scanning was highly useful, not only for the project engineers, but also other members of the design team. Landscape architects are involved in a wide array of different project types, and there are many potential uses for laser scanning and many opportunities to incorporate BIM technology into landscape architecture projects. The AEC industry is heading full-tilt in the direction of 3D design, and laser scanning provides an excellent tool that benefits the design team in a myriad of ways. It seems apparent that, soon, all major design and construction projects will require BIM at one level or another. Landscape architects should consider involving laser scanning in their projects to accurately document existing conditions in a 3D virtual environment.

Happy 90th to Haag!!

For over 90 years, Haag has served the legal and insurance industry, corporations, manufacturers, private companies, and individuals. Our growth results directly from our long-standing commitment to quality while expanding our technical knowledge and services.

“...we’re not good because we’re old, we’re old because we’re good…”

Polly Prado, Director of Corporate Communications
Denver International Airport South Terminal Redevelopment

Currently under construction at the Denver International airport is a large scale addition which will include a 500 room hotel and a light rail station, which will connect a 23-mile rail line from downtown Denver to the airport. In November, H3DS was contracted by the building’s general contractor to provide as-built documentation and modeling services for the two steel canopies that are being erected over the light rail station and over a lounge in the hotel. The contractor needed highly accurate 3D models of the structures to compare the as-built work with the proposed design so the skylight manufacturer can precisely design the support fittings needed to position the skylight panels smoothly and evenly above the structural framework. Utilizing our HDS7000, the scanning crew completed the scanning work in just a few hours, scanning from under the structure, from outside the structure, and from elevated positions on unfinished upper floors of the hotel. The deliverables for this project consisted of a 3D model of the complicated steel dia-grid canopy structure, utilizing AutoCAD 2014 in conjunction with Leica’s CloudWorx for AutoCAD Pro, delivered to the client in DWG format, and TruView.

One of the tools in the H3DS arsenal is Autodesk® Navisworks®. Our main uses of the program are clash detection with point cloud to model and the ability to give clients a viewing platform for point cloud data and models. For clash detection of existing models, our staff inserts the point cloud data and verifies visually that it matches to the client’s model. We are able to save days, if not weeks, in the field, as Navisworks provides better control over project outcomes. Entire project models can be published and viewed in NWD and DWF file formats to provide valuable digital assets from design through construction. This tool, along with its freeware viewer, allows the entire project team to view, coordinate and clash detect point cloud data and models.

Quick Tip:
Prior to utilizing, update your “Global Settings” using F12. This allows access to a variety of functions and file reader settings. For example, the default setting requires that when importing a DWG/DXF file, if layer is frozen, it will not be imported. Benefits include:
- A unified point cloud converts more efficiently into NWD file
- Opening the model before the appending point cloud can make navigation easier

The Leica ScanStation P20
The Industry’s Best Performing Ultra-High Speed Scanner

Within the industry of laser scanning there is always a new product evolving, but the P20 scanner is proving to be a game changer. This scanner is a time-of-flight scanner that utilizes a class 2 “eye safe” laser, collects 1 million points per second, and has a built-in 5 megapixel color camera. The time-of-flight laser provides up to 120 meters of range and it offers a greater range of temperature for working conditions. With this scanner in our toolbox, we can provide better and faster support for our clients.
SEPTA
Wayne Junction Substation

In November, H3DS was contracted as a subconsultant to provide as-built documentation and modeling services for an electrical substation. The substation is owned by SEPTA, which operates the public transportation system, and provides the much needed electricity to run their stations, trolleys and trains within this region of the City of Philadelphia. This station was scheduled for electrical upgrades and the electrical contractor required a model of the existing conditions in order to start their design. Utilizing our HDS7000, the scanning crew completed the data acquisition in one day. The project surveyor supplied H3DS with PA State Plane Coordinates for our survey control points. After completing the registration and the geo-reference, H3DS modelers utilized AutoCAD 2014 in conjunction with Leica’s CloudWorx for AutoCAD Pro to complete the model.

RESIDENTIAL BUILDING
Gladwyne, PA

3D imaging is a relatively new development in the field of architectural design. More and more architects, including small and independent practices, are now designing their projects in 3D from the schematic/conceptual design stages through construction documents and building commissioning. Laser scanning can play a central role in verifying the as-built conditions of a building, for both interior and exterior features, and is especially useful for areas that are difficult to gain physical access to. H3DS recently completed scanning the interior and exterior of a 6,800 square-foot residence for an architectural firm’s use in designing renovations. Field work was completed in one day using our Leica HD7000 scanner, and the deliverables included a 3D AutoCAD model as well as 2D AutoCAD floor plans and exterior elevations.

3D Printing / Model Shop

Haag’s Sugar Land, Texas, office contains a Model Shop where scaled models are fabricated for trials using a variety of tools and materials including a recently purchased 3D Printer. The Model Shop has been in operation for over 14 years and has recreated a variety of scenes including crane collapses in New York, Hoover Dam Bypass Bridge cableway, various mechanical failures and other incidents that were more clearly presented visually, rather than verbally, during a trial. The models created have been accepted in numerous trials nationwide and have been useful in supporting our expert witnesses and their findings.

Supplementing our Model Shop is a 3D Printer that creates 3D scaled models of accident scenes and equipment utilizing 3D Models and existing 3D Laser Scan data. The 3D Prints are often used for complex parts and apparatus including mechanical elements, gears, pulleys and other assemblages. 3D Models created from our 3D Printer have been accepted in multiple trials, including a criminal trial in New York.
**Haag 3D Solutions** provides professional 3D geospatial solutions for all types of design and construction projects. Haag 3D Solutions, LLC is a technology and services company specializing in the application of 3D imaging and BIM technologies, delivering highly accurate and reliable as-built documentation for both public and private sector clients. Having completed hundreds of 3D Laser Scanning and BIM assignments throughout North America, the Haag 3D Solutions team has gained a uniquely practical familiarity with 3D Laser Scanning technology and processes and offers real solutions to a wide variety of measurement and physical documentation tasks. Haag 3D is a division of Haag Engineering, forensic engineers & consultants since 1924.

The **Haag 3D Solutions** division is located in Mt. Laurel, NJ and Houston, TX, and compliments the entire Haag Engineering team and offices throughout the United States.