

3D Laser Scanning for Heritage: What are the Benefits?

Westhill Digital Heritage

Heritage site managers often ask why they should consider 3D laser scanning for documenting their historic building or landscape. The following describes the tool and how it can be used to digitally preserve heritage sites. In short, 3D laser scanning can be used to quickly record a heritage site using millions of location points. The captured spatial data is measurable, detailed, precise, and this rich 3D archive can be used to produce many deliverables for conservation and dissemination.

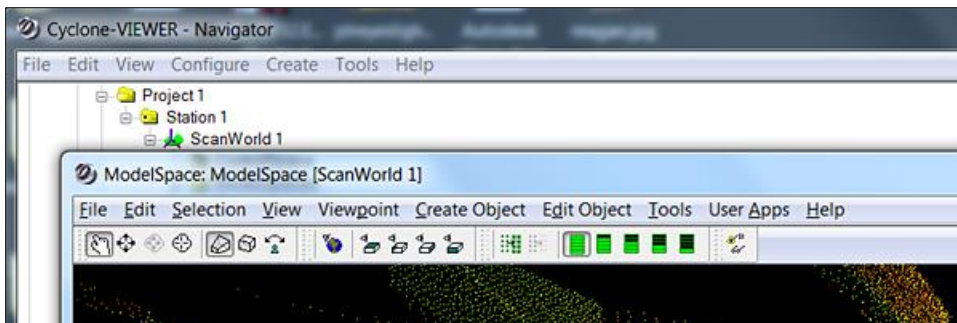
Scan a Room, Building, or Landscape.

A 3D laser scanner is used to make a spatial recording of an area at the site such as an interior room, the exterior side of a building, or a section of ground. The scanner will record the location of everything within a 360-degree area, items up-close and as far away as a few hundred feet from the location of the scanner. Multiple scans are usually required to fully record the subject of interest. Detailed high resolution and high dynamic range photography is usually collected at the same time.



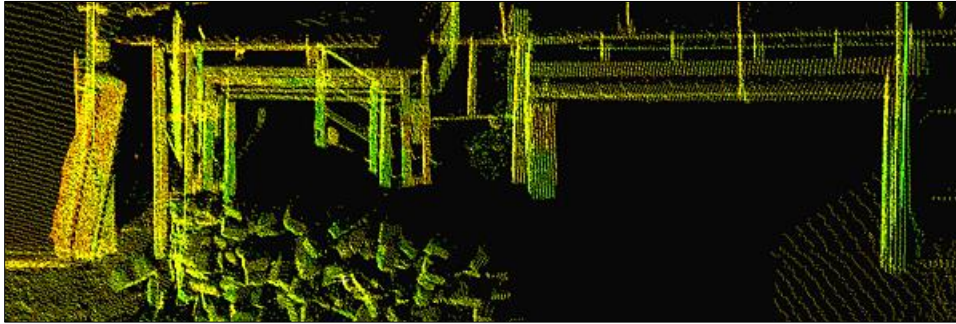
Use Software to Build a Useful Dataset from the Site Recordings.

Back at the office, software is used to process the acquired spatial scans and photography. Multiple spatial scans can be joined together for a recording of many rooms, an entire building, or a larger area of landscape. A single 360-degree scan of an area may hold millions of individual locations, each location represented by a point, each point evenly spaced a few millimeters apart. The data that results from this scan is called a point cloud, and it is a measurable representation of the scanned subject. Photography can be combined with the point cloud or used separately.



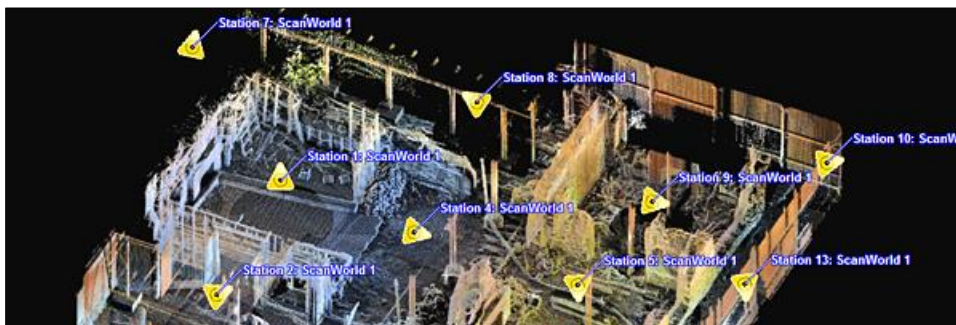
Archive the Site Recording.

The processed site recording is a very rich dataset that can be mined for many uses. This is because the dataset contains so much information, and is so precisely measured, studying the dataset is almost the same as studying the actual subject. Often this raw dataset itself is the primary deliverable and is used for archival purposes. CyArk is an excellent example of an organization that maintains and archives point cloud datasets, effectively creating a digital library of world heritage sites (see <http://cyark.org>).



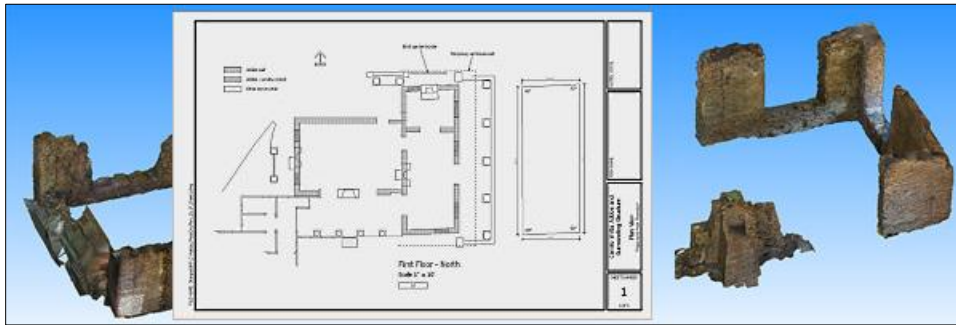
Produce Further Deliverables for Site Preservation Purposes.

A site recording containing millions of 3D location points with associated photography can be used to produce many measured deliverables for site preservation purposes. Typically these deliverables fall under two categories: conservation and dissemination. Heritage site managers may decide to use the data for internal site management purposes, for public outreach and interpretive purposes, or a combination of both.



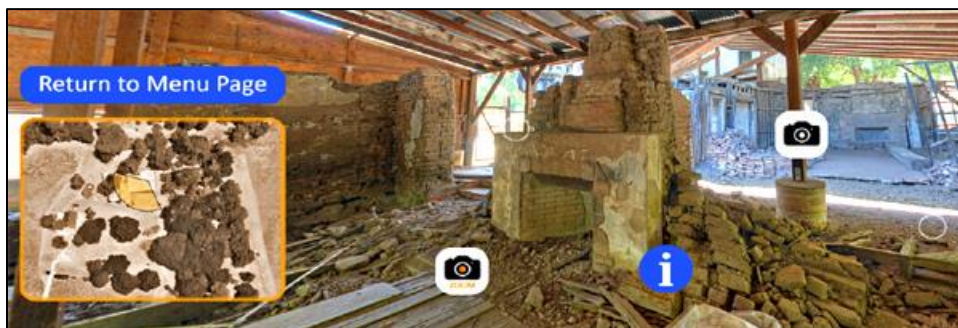
Conservation and Site Management.

Measured 2D CAD drawings can be derived from the site recording and are typical deliverables for site management purposes. 2D plan views, elevation views, and site maps are required for standard documentation and are used for the National Register of Historic Places application and Historic American Building Survey documents. Special online viewers can be used to review and measure a site in 3D space. More advanced applications might involve spatial analysis, detecting spatial changes over time, determining volume, or detecting spatial relationships.



Public Outreach and Interactive Interpretation.

3D models can be derived from the site recording for the purpose of online exploration and interactive discovery. Text, photography, video, and audio can be combined with a 3D environment to produce innovative interpretive tools designed to connect an interested public to your site. 3D models can also be used to produce 3D prints, very accurate physical models that can be used for study or for public exhibition.



3D laser scanning has many benefits and can be used for purposes beyond just heritage site documentation. This paper mentions a few of the more common uses. The potential for this digital approach to heritage site preservation continues to expand.