



FIELD NOTES

## **New Survey Methods Employed for Restoration Project**

The Muskingum Park project involves restoring the historic Start Westward Monument, designed by Mount Rushmore sculptor Gutzon Borglum



---

*April 15, 2020*

*POB Editorial Staff*

---

The Muskingum Park project involves restoring the historic Start Westward Monument, designed by Mount Rushmore sculptor Gutzon Borglum.

When the city of Marietta, Ohio, was founded in 1788, surveying instruments consisted of not much more than a compass and Gunter’s chain. Teams of surveyors would set out on horseback to map territories and establish state borders and property lines.

In 2020, as the city looks to renovate Muskingum Park and restore the park’s centerpiece – the Start Westward Monument – one surveyor employed global navigation satellite system (GNSS) equipment, a robot, an unmanned aircraft system (UAS) and 3D laser scanning to gather the data that architects, engineers and planners will need to complete the project.

The new surveying methodologies generate reams of data and information to enable engineers, architects and planners to do their work more efficiently and accurately and to better communicate the city’s plans to the public.



Woolpert, a global architecture, engineering and geospatial firm headquartered in Dayton, Ohio, was contracted to provide the landscape, architecture, engineering, planning and design services on the multiphase project. West Virginia-based Pickering Associates was hired to survey the project areas, including scanning the monument.

With the assistance of state-of-the-art UAS, 3D laser scanning technologies and GNSS satellites thousands of miles above the Earth, Pickering's surveyor collected more than 15 gigabytes of raw data in a matter of hours. The raw data was georeferenced to Ohio's State Plane Coordinate system, then processed to produce a 3.91 GB orthomosaic image and 3D point cloud.

The project required all of Pickering's surveying capabilities to be utilized, said Bill Showalter, survey department manager for Pickering Associates.

"The principles, standards, and practices of land surveying are almost the same now as they were back when Marietta was founded," Showalter said. "What has changed is the ability to quickly capture data with fewer people in a safer, more productive manner. What would have taken a team of surveyors several days to collect, one man can do in a matter of hours, and the quality of the data is much higher."

## **GNSS Ground Control and Public Hearings**

Showalter said Pickering's base and rover real-time kinematic (RTK) GNSS equipment was used initially to establish ground and aerial control for the entire park. In about four hours, the surveyor, utilizing RTK GNSS, located approximately 25 points for both terrestrial surveying and aerial mapping.

The UAS was then flown at an altitude of 350 feet for approximately 1.5 hours over the entire park, roughly 54 acres. The UAS captured 904 images, not only of the entire park but the adjacent museum, surrounding city blocks, homes, and nearby Muskingum River.

The imagery was then constrained to the ground control data to create the orthomosaic and the 3D point cloud.

The aerial imagery will be important tools that city officials and project managers can use to communicate the objectives of the plans to the public, according to Woolpert Transportation Engineer Paul Denny, who is co-managing the project.

“The newest advances in technology enable us to fuse data from different techniques. You can take the UAS data, the scanning data, and the traditionally collected data and merge them into one cohesive product,” Denny said. “When the public hearings start, the citizens of Marietta are not going to see just a conceptual drawing. They’re going to see their neighbors’ homes and the park they take their children to. Renderings and conceptual drawings are sometimes hard to picture in the real world.”

## **The Real and the Virtual**

The Start Westward Monument is a sandstone sculpture by Gutzon Borglum, who sculpted the presidential busts at Mount Rushmore. Dedicated by President Franklin D. Roosevelt in 1938, the monument pays tribute to the pioneers and revolutionary figures who established government in the Northwest Territory, but the sandstone has not held up well in the weather.

Pickering used a 3D laser scanner to collect 616 million data points, nearly 12 GB of raw data. The collection required 14 different equipment setups over a four-hour period. Processing the data took an additional two hours, which resulted in a 4.7 GB point cloud — a computerized virtual image of the statue that can be replicated to scale with a 3D printer.

Pickering Surveyor Daniel Park, who is also a landscape architect and certified UAS pilot, said the scanning equipment has several settings, but for this job it collected 44 million data points per scan. “It recorded a scan point at every 1/16 of an inch from approximately 30 feet away,” Park said. “It felt important to document the years of decline evident on this historic national monument and it will be rewarding to see it restored to its former glory.”

Pickering also employed its robotic total station to perform a detailed topographic/utility survey of two areas, a parking area that is slated to be expanded, and an entrance that is to be redesigned to better accommodate low-profile vehicles. The robotic system was used to collect approximately 800 data points of the two areas over an eight-hour period.

Denny said the new surveying methods have led to more precise engineering and better design plans.

“The new methodologies provide us with a lot more data,” Denny said. “When we’re expanding the road to add parking, for example, we can check more points to see where the low spots are. Now we have points everywhere and if we have a question on one spot, we can check it. The more robust datasets allow us to do our work more accurately, more efficiently and we can provide a higher-quality product for our client.”

Recent Articles By POB Editorial Staff

**New Features In Teledyne RESON SeaBat T-Series**

**Apple's New iPad Pro To Include LiDAR**

**French Aerial Survey Firm Purchases First Leica CityMapper-2**

**TraceAir and Independent Construction Launch a New Drone-Powered Haul Router Tool**

Copyright ©2020. All Rights Reserved BNP Media.

Design, CMS, Hosting & Web Development :: ePublishing