

NATIONAL PARK SERVICE
Booker T. Washington National Monument



SURVEY REPORT

**Title I Design and Contract Documents
“Acquire, Process, and Deliver Stationary
Terrestrial Laser-Scan Topographic Data for
Booker T. Washington National Monument,
Hardy, Virginia”
Contract #P10PC60951**

Reference: *PMIS 75685A*
*Prepare Cultural Landscape Treatment Plan which Addresses
a More Authentic Visual Interpretation*

Prepared by:



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Albany, New York 12205

January 14, 2015

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CHA

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PURPOSE OF SURVEY

The purpose of the survey was to perform, process and deliver a Stationary Terrestrial Laser Scan (STLS) of a 5 acre portion of the 207 acre former tobacco farm. This project was conducted for the National Parks Service (NPS) under the direction of the H. Eliot Foulds from the NER - Olmsted Center for Landscape Preservation Office located in Boston, Massachusetts. The on-site work was performed under the supervision of NPS representative, John Mitchell. The project area is located within the Booker T. Washington National Monument (BOWA) Park located at 12130 Booker T. Washington Hwy in Hardy, Virginia.

The project required CHA to establish values for a pair of GPS control points in the approximate centerline of the project area that would serve as the coordinate base for the STLS target locations throughout the area of interest (AOI). CHA also performed STLS at 14 locations throughout the site to document the full project area. The multiple datasets were registered to the project control to generate a single 3D point cloud and utilized to generate the contours for the site. CHA utilized conventional survey techniques to locate specific items of interest as well as obscured objects.

FIELD SURVEY & PROCESSING DATES

CHA performed the field survey during the week of November 17th, 2014. The GPS control and target network were established on November 18th, STLS data collection was performed on Wednesday November 19th and Thursday November 20th.

CHA performed the office computations and related mapping throughout the months December 2014 and January 2015. The final deliverables will be submitted upon NPS following approval, along with this report.

Prepared by:
CHA

Under the direction of:

John E. Quinn Jr., P.L.S.
Director of Survey Operations

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SURVEY PERSONNEL

The following list contains the names of the CHA personnel that were involved with the field locations and office processing for this project.

Office Staff:

John Quinn, Jr., P.L.S., - Director of Survey Operations, was responsible for the overall management of the tasks performed during the execution of this project. He is also responsible for the final quality control and quality assurance for the work conducted to complete this project.

Jody Lounsbury, P.L.S., - Project Manager, was responsible for the daily management and coordination of all tasks involved with the completion of this project.

Devon DeLuke, - Survey Technician, was responsible for the point reduction, drafting and digital terrain model (contour) generation.

Field Staff:

Jody Lounsbury, PLS, - Party Chief, was responsible for the client coordination, field work, planning and coordination of the GPS and STLS activities for this project.

Mike Short, Instrument Operator, - was responsible for the data collection for this project. He was in routine contact with the Party Chief to ensure all field activities were properly completed.

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EQUIPMENT & SOFTWARE

The following list illustrates the equipment CHA used to complete the STLS survey for this project. All of the equipment listed below were up to date on maintenance and firmware prior to the commencement of the field work.

GPS Equipment:

GPS Unit L3: Leica GX1230 Receiver (SN. 470412)
Leica AX1202 Antenna (SN. 08130048)
Leica RX1210T Controller (SN. 121955)

STLS Equipment:

Laser Scanner: Leica Scanstation 2 (SN. 1251305)
HP Mobile Workstation Laptop

TPS: Leica 1203 Robotic Total Station (SN. 211556)

SOFTWARE

GPS: Leica Geo Office

STLS: Leica Cyclone
Leica Cyclone Topoll
Leica Cloudworx
Leica TruView

Drafting: Autodesk AutoCAD 2013 Civil3D

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SURVEY CONTROL

CHA performed Static GPS observations to establish a pair of recoverable control points on the site within the project area. The two recoverable points are 36”, #5 rebar with yellow plastic caps marked “CHA BASELINE” set just below grade. The data was collected in two separate static occupations on each point utilizing a Leica 1200 GPS receiver on a 2m fixed height pole that was tripod supported. The first occupations on each point was for one hour, the second observations were ½ hour durations. GPS was processed utilizing OPUS solution and averaged values were converted to NAD83 Virginia South horizontal and NAVD 88 vertical datums. All methods utilized were in accordance to standard survey procedures for topographic survey control. GPS and conventional control survey were performed on, Tuesday November 18th. 2014.

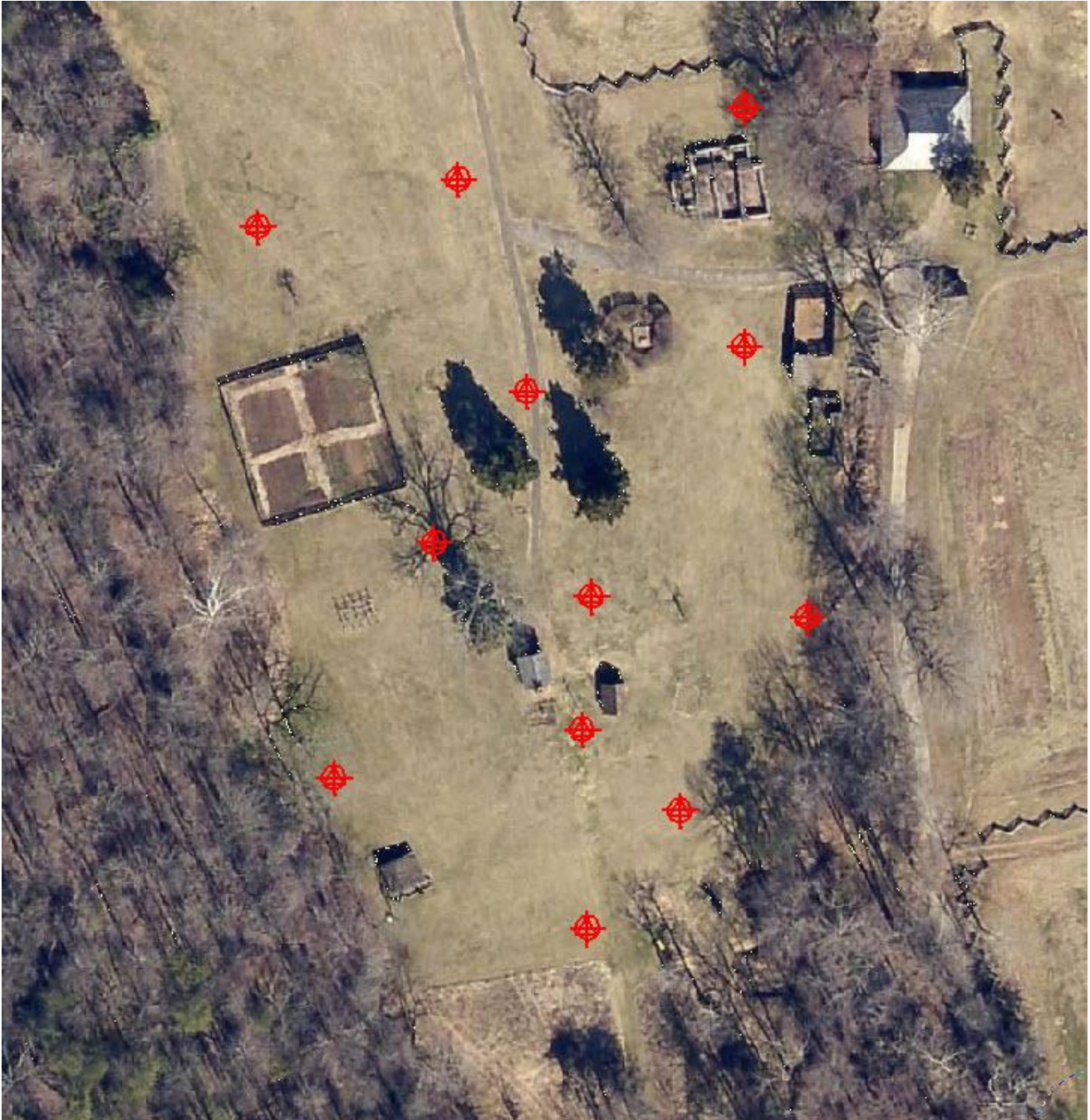
STLS TARGETS

CHA utilized the GPS control points to locate ten (10) targets throughout the project area to geo-reference the STLS data. A Leica 1203 robotic total station was used to double locate all targets that would be required to register the multiple scan location together into a single workable point cloud.

STLS DATA COLLECTION AND PROCESSING

CHA utilized a Leica Time of Flight 3D Laser Scanner to collect the exiting ground features within the 5 acre AOI. The site was documented from twelve (locations) at varying heights around the site (see STLS Scan Position Diagram below). The 12 individual scans were registered into a single point cloud using Leica Cyclone software. The registration was completed based on the 12 surveyed control points positioned throughout the site (see STLS Survey Control Diagram below). A minimum of four (4) control points were acquired at each scan position to ensure an accurate registration of the data sets. Two (2) scans were performed at each location to collect the point density and overlap required to completely document the entire project area. Once the registration was of the data was completed, the unified point cloud was exported to Leica Cyclone Topoll where the ground points and planimetric features were extracted to generate the Digital Terrain Model (DTM) and Mapping in Autodesk AutoCAD Civil 3D.

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STSL Scan Position Diagram

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STSL Survey Control Diagram

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PROJECT DELIVERABLES

CHA completed the STLS processing and generated a plan that included planimetric features and 0.25' contours for the project area. In addition to the mapping, CHA will also deliver the 3D point cloud in Leica Cyclone format accompanied by a Leica TruView file and software to allow access to the point cloud through Windows Internet Explorer.



Final Cadd File With 0.25' Contours



