

Final Survey Report

Blount, TN

15121



Dewberry®



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Table of Contents

Section 1: Narrative	2
1.1 Introduction	2
1.2 Applicable Standards.....	2
Section 2: Ground Control Geodetic Network Survey	2
2.1 Ground Control Points.....	2
2.2 Ground Control Station Collection.....	3
2.3 Ground Control Data Processing and Analysis.....	4
2.3.1 Ground Control Network Processing.....	4
2.4 Network Survey Final Coordinates.....	4
2.4.1 State Plane Coordinates.....	4
Section 3: Ground Cover Classification Survey	5
3.1 Ground Cover Classification Check Point Collection.....	5
3.2 Check Point Data Processing and Analysis.....	6
3.2.1 Ground Cover Classification Check Points.....	7

Section 1: Narrative

1.1 Introduction

A survey was performed to support the acquisition of Light Detection and Ranging (LiDAR) data for the Dewberry, Blount, TN area of interest.

1.2 Applicable Standards

This Geodetic Control GPS Survey was conducted to support LiDAR data in accordance with the current USGS guidelines.

Section 2: Ground Control Geodetic Network Survey

2.1 Ground Control Points

A GPS control network was performed for the purpose of establishing three-dimensional coordinates on each of the base station locations. The control network included a combination of a National Geodetic Survey (NGS) Control Monument ***D 295, GPS 34 V2 92, and LHT 682*** and Atlantic Temporary Control Points (***CP02, CP03, CP04, CP05, CP06, CP07, CP08, CP09, CP10, CP11, CP12, CP13, CP14, CP15, CP16, CP17, CP18, CP19, CP20, and SETPOINT***).

A graphical representation of all the ground control points is provided in figure 1:

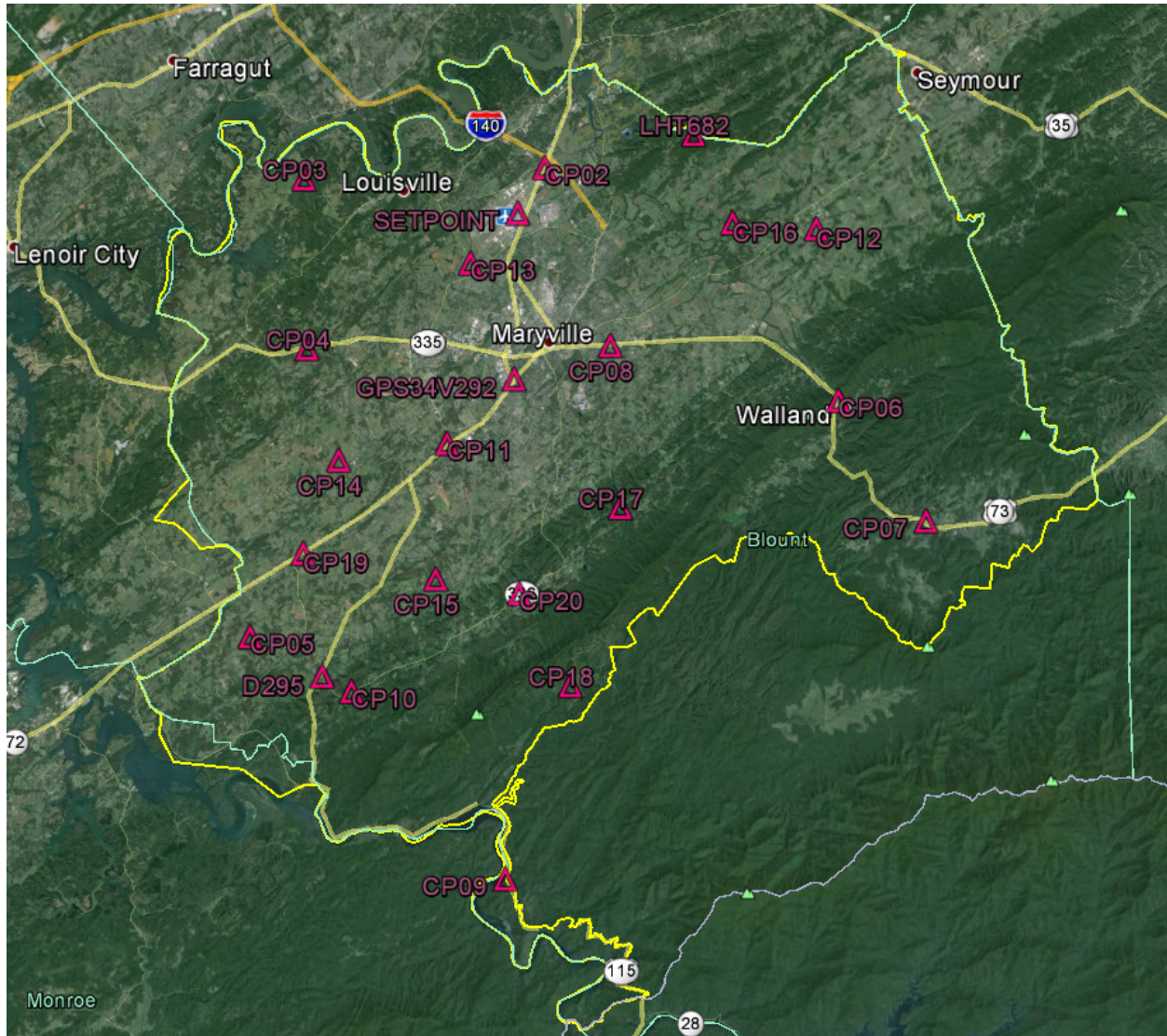


Figure 1: Ground Control Geodetic Network Points

2.2 Ground Control Station Collection

GPS observations at all ground control points in the network were made with Leica System 500 dual-frequency GPS-receivers with a Leica AT502 antenna and a Topcon HiPER V with a Topcon TPSHIPERV antenna between March 2015 and May 2015. Both GPS receivers were configured to log data at 1 Hz, and at a 10 degree mask. Session lengths were based upon the distance between points and were set for a minimum of one hour per every 10 km.

2.3 Ground Control Data Processing and Analysis

Data collected during each GPS session was processed using GrafNet 8.50.4320 with their respective GPS antenna type, and antenna height reading. A network was processed in order to establish coordinates and height values for all points. The RMS values for the latitude, longitude and ellipsoid heights for all results were reviewed to ensure that they are within acceptable limits. Two adjustments were made during each network’s development. Each adjustment reports baseline RMSE and residual values at the control points.

2.3.1 Ground Control Network Processing

The network development involved performing a minimally constrained network adjustment, holding NGS monuments (**GPS 34 V2 94, LHT 682 and d 295**) as a horizontal and vertical control point. This minimally constrained adjustment allowed for blunders and errors to appear within the network. These blunders were analyzed and the baselines were rejected if they had high residuals against other redundant baselines.

Twenty three (23) control points within the network were then fully constrained for a final network adjustment, holding NGS monuments (**GPS 34 V2 94, LHT 682 and d 295**) as a horizontal and vertical control point. Geoid12A was utilized during GPS processing. In all, sixty (60) baselines were kept in the fully constrained adjustment after the final network analyses. Final network control values were then assigned to Atlantic Temporary Control Points (**CP02, CP03, CP04, CP05, CP06, CP07, CP08, CP09, CP10, CP11, CP12, CP13, CP14, CP15, CP16, CP17, CP18, CP19, CP20, and SETPOINT**). A tabulated summary of the final coordinates resulting from the network survey are listed in section 2.4.1

2.4 Network Survey Final Coordinates

After analyzing all fully constrained final network adjustments, a tabulated summary of the final coordinates were established for all ground control points. These summaries are listed below.

2.4.1 State Plane Coordinates

NAD83 (2011), State Plane Tennessee, NAVD88, Geoid12A, U.S. Survey Feet.

Ground Control Points			
Point ID	Easting (ft)	Northing (ft)	Elevation (ft)
CP02	2569395	551637.8	964.432
CP03	2531378	549101.3	818.192
CP04	2532423	522438.5	889.614
CP05	2524416	476995.9	938.73
CP06	2616548	516012.1	932.815
CP07	2630808	497405.5	1028.514
CP08	2580370	523890.3	1048.216
CP09	2565529	439865	892.138
CP10	2540614	468746	978.621
CP11	2554917	508009.5	1035.623

Point ID	Easting (ft)	Northing (ft)	Elevation (ft)
CP12	2612511	542933	1038.73
CP13	2557989	536402.1	928.463
CP14	2537834	505017.5	949.461
CP15	2553561	486702.4	979.52
CP16	2599276	543585	899.822
CP17	2582488	498521.8	1052.72
CP18	2575184	470420.9	1270.154
CP19	2532524	490262.5	872.368
CP20	2566808	484660	1012.064
D295	2535919	471039.7	904.862
GPS34V292	2565289	518326.9	1030.834
LHT682	2592822	557256.1	1074.078
SETPOINT	2565307	544380.5	953.493

Section 3: Ground Cover Classification Survey

3.1 Ground Cover Classification Check Point Collection

GPS observations were conducted at each ground control point (except OT04, HG07 and LT06) in order to conduct a Virtual Reference Station (VRS) survey. GPS observations at each VRS ground control point were made with a Topcon GRS1 GPS-receiver configured to log data at 1 Hz, and at 10 degrees mask.

GPS static observations for OT04, HG07 and LT06 were conducted with a with Leica System 500 dual-frequency GPS-receivers with a Leica AT502 antenna configured to log data at 1 Hz, and at a 10 degree mask, for a minimum duration of twenty (20) minutes.

All check points collected represent differing types of ground cover observed during the course of both surveys and were conducted between March 2015 and May 2015.

The purpose of this survey was to collect ground check points for use during the processing of the LiDAR data to ensure that the highest possible accuracy was achieved.

A graphical representation of all the Ground Cover Classification Check Points is provided in figure 2:

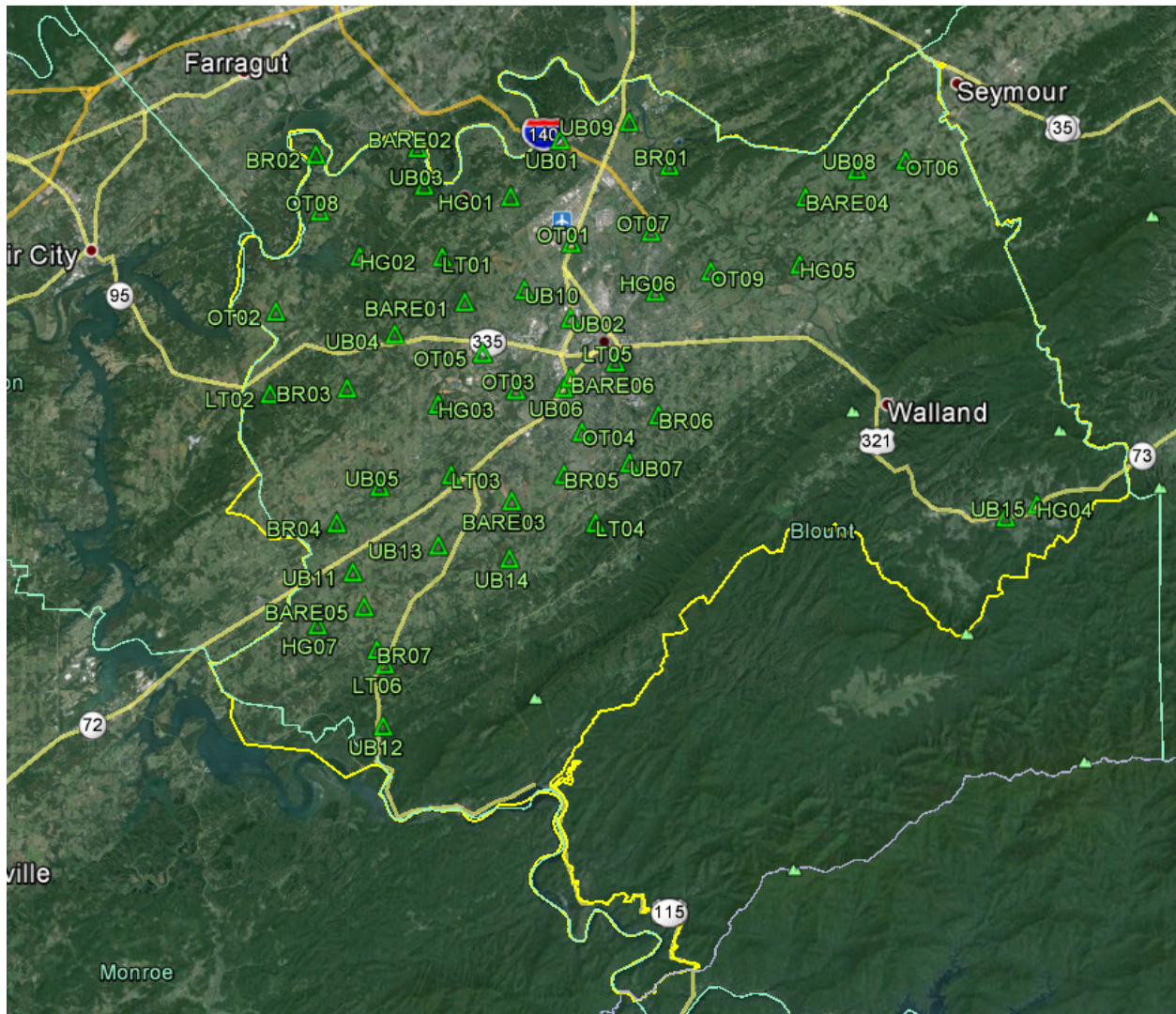


Figure 2: Ground Cover Classification Check Points

3.2 Check Point Data Processing and Analysis

Data collected for OT04, HG07 and LT06 were uploaded to the National Geodetic Survey's (NGS) On-Line Positioning User Service (OPUS) server with their respective GPS antenna type, and antenna height reading. The resulting solution for each observation is referenced to NAD-83 (North American Datum). The RMS values for the latitude, longitude and ellipsoid heights for each result were reviewed to ensure that they are within acceptable limits. The Ellipsoidal elevations supplied by NGS were transformed into Geoid12A orthometric heights.

A tabulated summary of the final coordinates resulting from the Ground Cover Classification Survey are listed in sections 3.2.1

3.2.1 Ground Cover Classification Check Points

NAD83 (2011), State Plane Tennessee, NAVD88, Geoid12A, U.S. Survey Feet.

LiDAR Check Points				
Point ID	Easting (ft)	Northing (ft)	Elevation (ft)	Description
BARE01	2547542	530375.1	996.702	Bare Earth
BARE02	2539193	555474	863.925	Bare Earth
BARE03	2556011	497937.1	1038.762	Bare Earth
BARE04	2603378	548719.4	1009.545	Bare Earth
BARE05	2532017	480072.4	991.154	Bare Earth
BARE06	2565289	518326.9	1030.693	Bare Earth
OT01	2564932	540411.8	940.564	Open Terrain
OT02	2516417	528143.4	963.534	Open Terrain
OT03	2556293	516139.2	946.459	Open Terrain
OT04	2567317	509461.8	1030.736	Open Terrain
OT05	2550670	522053.6	962.092	Open Terrain
OT06	2619746	555142.4	998.212	Open Terrain
OT07	2578027	542533	877.223	Open Terrain
OT08	2523310	544761.7	862.709	Open Terrain
OT09	2587997	536253.4	984.866	Open Terrain
UB01	2562726	557314.5	916.699	Urban Terrain
UB02	2565037	528083.9	877.681	Urban Terrain
UB03	2540433	549327.5	868.77	Urban Terrain
UB04	2536091	524892.6	956.24	Urban Terrain
UB05	2534178	499805	936.903	Urban Terrain
UB06	2564156	516669.1	1033.435	Urban Terrain
UB07	2575265	504562.7	1074.977	Urban Terrain
UB08	2611786	553411.7	1025.018	Urban Terrain
UB09	2574034	560460.4	934.663	Urban Terrain
UB10	2557340	532541.9	907.972	Urban Terrain
UB11	2530025	485693.7	995.05	Urban Terrain
UB12	2535536	460570.7	848.465	Urban Terrain
UB13	2544037	490397.1	965.75	Urban Terrain

Point ID	Easting (ft)	Northing (ft)	Elevation (ft)	Description
UB14	2555822	488466	1032.595	Urban Terrain
UB15	2637432	496995.1	1080.588	Urban Terrain
BR01	2580852	553425.9	991.595	Brush
BR02	2522462	554063.9	823.351	Brush
BR03	2528431	515836.1	877.219	Brush
BR04	2527166	493686.9	889.405	Brush
BR05	2564504	502416.3	1050.966	Brush
BR06	2579883	512496.5	1025.921	Brush
BR07	2534235	473080.9	927.251	Brush
HG01	2554727	547801.9	869.786	High Grass
HG02	2530043	537457.5	876.134	High Grass
HG03	2543544	513505.3	1113.221	High Grass
HG04	2642545	499179.5	1074.449	High Grass
HG05	2602644	537673.6	929.399	High Grass
HG06	2578959	532707.8	986.804	High Grass
HG07	2524379	476909.6	935.802	High Grass
LT01	2543658	537694.2	862.116	Low Trees
LT02	2515726	514650.6	835.094	Low Trees
LT03	2545918	501977	974.636	Low Trees
LT04	2569884	494626.9	1025.811	Low Trees
LT05	2572597	521043.8	991.203	Low Trees
LT06	2535590	470737.2	917.052	Low Trees