

PHOTOGRAMMETRIC GROUND CONTROL  
SURVEY REPORT



OSMRE TENNESSEE LIDAR AND ORTHO PROJECT  
UNITED STATES GEOLOGICAL SURVEY (USGS)

CONTRACT NUMBER: G10PC00057

LIDAR TASK ORDER NUMBER: G11PD00240

ORTHO TASK ORDER NUMBER: G11PD00238

Woolpert Project Number: 071278

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April 2011



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# SECTION 1



# SECTION 1: PHOTOGRAMMETRIC GROUND CONTROL SURVEY REPORT

## INTRODUCTION

This report contains a comprehensive outline of the Photogrammetric Ground Control Survey that supported the 20112011 USGS-OSMRE Tennessee LiDAR and Ortho Task Order Project; Contract Number G10PC00057, Task Order Number G11PD00240, for the United States Geological Survey (USGS).

## PROJECT AREA

The entire project area encompasses approximately 300 square miles of rural Tennessee, approximately 30 miles northwest of Knoxville, TN.

## PURPOSE

The purpose of this survey was to establish three-dimensional coordinates for eleven (11) new photogrammetric quality ground control points used for the digital imagery aerial aerotriangulation, twenty (20) new photogrammetric quality digital orthophoto independent QA/QC check points, thirteen (13) new photogrammetric quality LiDAR QA/QC bare earth ground check points used during LiDAR data processing, and twenty (20) new photogrammetric quality LiDAR independent QA/QC bare earth check points. The photogrammetric quality ground control points and QA/QC points were located throughout the project area to support the digital orthophotos and the LiDAR data collected at a nominal pulse spacing (NPS) of 1.0 meters. The LiDAR data was collected to meet a 95% confidence level as outlined in the *Geospatial Positioning Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy (NSSDA)*, published by the Federal Geographic Data Committee (FGDC-STD-007.3-1998), to comply with FEMA guidelines.

## DATE OF SURVEY

All ground control field operations took place March 8, through March 27, 2011.

## MONUMENTATION

Prior to the LiDAR mission, Woolpert field crews performed a field reconnaissance to verify the existence and suitability of pre-selected existing National Geodetic Survey (NGS) control stations. These existing control stations were utilized to insure that quality x, y, and z coordinate values were computed for each of the newly established photogrammetric control stations.

Woolpert surveyed eleven (11) new photogrammetric quality ground control points used for the digital imagery and thirteen (13) new photogrammetric quality LiDAR QA/QC bare earth ground check points used during LiDAR data processing in specific areas throughout the project limits. Each supplemental ground control station was observed on a variety of terrain types that were suitable for GPS, digital imagery, and LiDAR measurement. These stations were used to control and calibrate the data's horizontal and vertical values.

Woolpert also established twenty (20) new photogrammetric quality independent QA/QC check points in designated locations to verify the accuracy of the digital orthophotos. Twenty (20) new photogrammetric quality LiDAR independent QA/QC bare earth check points were surveyed for use by USGS to verify the accuracy of the LiDAR mission. These newly established photogrammetric quality check points were also observed on a variety of terrain types that were suitable for GPS, digital imagery, and LiDAR measurement

Recovery information sheets for the newly established supplemental control stations can be found in Section 3. A control diagram showing the ground control stations used to support this photogrammetric mapping project can be found in Section 5 of this report.

## GPS EQUIPMENT

Woolpert utilized three (3) Trimble Navigation R8/5800 series GPS receivers with three (3) Trimble Navigation TSC2 data collectors as rovers, one of the R8/5800 receiver was used as a base receiver for this project.

## METHODOLOGY

Rapid-Static GPS surveying techniques were used for measuring of all ground control stations and the GPS control network. Each observation session utilized a 5-second sync rate, with a 15° elevation mask, lasting between 20-90 minutes depending on the baseline length, number of satellites and satellite geometry.

## GPS DATA ANALYSIS, PROCESSING AND ADJUSTMENT

All ground control observations were processed using Trimble Navigation’s Trimble Business Center (TBC) Version 2.00. After the post-processing of the raw data was completed, the network was subjected to rigorous loop-closure analysis; whereby, unacceptable GPS vectors were removed and field blunders, if any, were detected and eliminated. Once this process was completed, Woolpert performed unconstrained and constrained least-squares adjustments, once again, using TBC. Both unconstrained and constrained adjustments were computed using trivial and nontrivial baselines.

Daily processing allowed the field crews to discover any weak links in the network and immediately schedule re-observations of the affected baselines, if necessary. Once the fieldwork was complete, the processed baselines were then run through a rigorous loop closure analysis. Any baselines that failed this analysis were either reprocessed or removed from the network.

After an acceptable unconstrained least-squares adjustment was obtained, Woolpert performed a fully constrained least-squares adjustment by fixing the GPS network NGS Continuously Operating Reference Stations (CORS) and existing NGS control stations with known coordinate data. During this project, the following stations were fixed during the constrained adjustment:

Dimension	Existing NGS Control and CORS Stations
3-D Control Stations	GPS 6, GPS 7, Q 197, U 201, and Y 195
CORS Stations	TDOT DISTRIC 19 CORS ARP (TN19)

# DATUM REFERENCE AND FINAL COORDINATES

For this survey, the GPS control was based on Universal Traverse Mercator (UTM) Zone 16 North and Tennessee State Plane Coordinate Systems, both referenced to the NAD 83(2007) datum and GEOID 09. Orthometric heights are based on the NAVD88 datum. All coordinate values are provided in U.S. Survey Foot and meters. The coordinates for the ground control survey can be found in Section 2 of this report.

## ACCURACY STATEMENT

Existing NGS published control stations were surveyed to assure that there were no discrepancies in the field observation data. Close examinations of the residuals showed no distortions in orientation or scale.

The ground control survey meets positional accuracies necessary to support LiDAR data collected at a nominal pulse spacing (NPS) of 1.0 meters at the 95% confidence level as outlined in the *Geospatial Positioning Accuracy Standards, Part 3: National Standard for Spatial Data Accuracy (NSSDA)*, published by the Federal Geographic Data Committee (FGDC-STD-007.3-1998), to comply with FEMA guidelines.

# SECTION 2



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## SECTION 2: GROUND CONTROL STATION COORDINATE LIST

This section includes a complete list of the final Tennessee State Plane and UTM Zone 16N coordinates and Orthometric Heights, referenced to the NAD 83(2007) Datum, expressed in U.S. Survey Foot and meters.

**Project:** USGS-OSMRE Tennessee LiDAR and Ortho  
**Location:** Caryville, Tennessee  
**Horizontal Datum:** NAD83/2007  
**Vertical Datum:** NAVD88  
**Grid Zone:** Tennessee State Plane Coordinate Zone  
**Geoid Model:** GEOID09  
**Units of Measure:** U.S. Survey Foot

Station	Northing (ft)	Easting (ft)	Ortho. Ht. (ft)	Type
1	687020.750	2351283.602	1591.062	Panel Point
2	726876.276	2407608.526	1151.549	Panel Point
3	729855.698	2449011.296	1272.613	Panel Point
4	775259.276	2463752.805	2006.214	Panel Point
5	793701.711	2535278.381	1152.718	Panel Point
6	759322.649	2529947.173	1209.697	Panel Point
7	726947.921	2492204.126	1111.395	Panel Point
8	658380.754	2456349.970	3117.023	Panel Point
9	656170.241	2434819.478	1549.069	Panel Point
10	659934.551	2373300.396	1044.062	Panel Point
11	675082.528	2474288.300	1420.528	Panel Point
101	690165.385	2361780.906	1515.599	USGS QA/QC
102	671423.033	2394370.519	1277.487	USGS QA/QC
103	701913.042	2425097.001	2660.434	USGS QA/QC
104	671611.474	2426254.513	2879.871	USGS QA/QC
105	683382.995	2419353.164	2817.333	USGS QA/QC
106	665415.724	2445224.327	1448.283	USGS QA/QC
107	772269.132	2533383.496	1355.657	USGS QA/QC
108	772630.233	2488584.006	1370.590	USGS QA/QC
109	788023.618	2532739.196	1338.327	USGS QA/QC
110	741614.246	2490873.036	1763.773	USGS QA/QC
111	687789.116	2463655.555	1336.554	USGS QA/QC
112	753100.483	2520240.318	1085.460	USGS QA/QC
113	724663.662	2488610.869	1064.110	USGS QA/QC
114	717404.647	2465168.557	2558.091	USGS QA/QC
115	750995.025	2481994.887	1706.031	USGS QA/QC

Station	Northing (ft)	Easting (ft)	Ortho. Ht. (ft)	Type
116	726441.708	2426452.841	1367.736	USGS QA/QC
117	754066.500	2460321.435	1484.028	USGS QA/QC
118	702083.911	2459879.867	1363.483	USGS QA/QC
119	656932.921	2439724.841	1499.613	USGS QA/QC
120	674798.275	2364125.755	1314.920	USGS QA/QC
501	690099.936	2352013.299	1551.594	Ortho QA/QC
502	668487.442	2366560.663	1414.881	Ortho QA/QC
503	656042.882	2434352.047	1559.047	Ortho QA/QC
504	661795.188	2454199.581	2705.807	Ortho QA/QC
505	676055.343	2473382.147	1412.719	Ortho QA/QC
506	730292.229	2449461.969	1222.658	Ortho QA/QC
507	724935.864	2406505.277	1146.743	Ortho QA/QC
508	770753.301	2465401.697	1197.560	Ortho QA/QC
509	788049.109	2532775.580	1338.187	Ortho QA/QC
510	752318.814	2521140.093	1080.526	Ortho QA/QC
511	730059.257	2493447.658	1125.576	Ortho QA/QC
512	772072.701	2533311.381	1353.598	Ortho QA/QC
513	664983.046	2444812.576	1481.589	Ortho QA/QC
514	749175.850	2484345.545	1744.820	Ortho QA/QC
515	762088.038	2468404.926	1522.386	Ortho QA/QC
516	754110.259	2460382.502	1485.993	Ortho QA/QC
517	774946.756	2536745.702	1456.795	Ortho QA/QC
518	687804.517	2463607.890	1335.061	Ortho QA/QC
519	667473.436	2430862.614	2642.018	Ortho QA/QC
520	794041.476	2535504.537	1229.411	Ortho QA/QC
1001	681959.098	2363493.465	1280.054	LiDAR QA/QC
1002	724948.749	2406197.993	1156.546	LiDAR QA/QC
1003	770814.840	2465244.459	1213.650	LiDAR QA/QC
1004	774868.038	2490897.994	1494.615	LiDAR QA/QC
1005	788077.567	2532732.744	1339.229	LiDAR QA/QC
1006	756628.179	2520125.720	1186.673	LiDAR QA/QC
1008	701314.377	2474253.682	1392.425	LiDAR QA/QC
1009	729665.826	2448976.101	1271.113	LiDAR QA/QC
1010	663280.350	2465065.659	2711.994	LiDAR QA/QC
1011	667509.653	2447751.229	1389.686	LiDAR QA/QC
1012	745071.568	2488762.466	1766.958	LiDAR QA/QC
1013	672248.734	2410627.086	1251.354	LiDAR QA/QC
1014	668996.59	2373970.558	1183.843	LiDAR QA/QC

**Project:** USGS-OSMRE Tennessee LiDAR and Ortho  
**Location:** Caryville, Tennessee  
**Horizontal Datum:** NAD83/2007  
**Vertical Datum:** NAVD88  
**Grid Zone:** UTM 16N  
**Geoid Model:** GEOID09  
**Units of Measure:** Meters

Station	Northing (m)	Easting (m)	Ortho. Ht. (m)	Type
1	4010102.633	706533.543	484.957	Panel Point
2	4022432.306	723576.412	350.993	Panel Point
3	4023473.653	736189.090	387.894	Panel Point
4	4037363.745	740536.773	611.495	Panel Point
5	4043219.584	762284.569	351.349	Panel Point
6	4032719.491	760770.938	368.716	Panel Point
7	4022726.132	749367.417	338.754	Panel Point
8	4001705.696	738655.066	950.071	Panel Point
9	4000963.349	732097.831	472.157	Panel Point
10	4001915.691	713331.164	318.231	Panel Point
11	4006855.044	744071.141	432.978	Panel Point
101	4011094.649	709723.461	461.956	USGS QA/QC
102	4005484.860	719717.890	389.379	USGS QA/QC
103	4014878.039	728987.939	810.902	USGS QA/QC
104	4005643.739	729437.511	877.787	USGS QA/QC
105	4009210.514	727296.012	858.725	USGS QA/QC
106	4003815.169	735240.661	441.438	USGS QA/QC
107	4036678.266	761776.664	413.205	USGS QA/QC
108	4036642.770	748115.939	417.757	USGS QA/QC
109	4041479.960	761528.873	407.923	USGS QA/QC
110	4027193.583	748914.271	537.599	USGS QA/QC
111	4010695.243	740788.733	407.383	USGS QA/QC
112	4030790.783	757831.348	330.849	USGS QA/QC
113	4022018.093	748279.191	324.341	USGS QA/QC
114	4019729.498	741155.152	779.708	USGS QA/QC
115	4030025.042	746177.066	520.000	USGS QA/QC
116	4022360.324	729322.670	416.887	USGS QA/QC
117	4030891.433	739559.237	452.333	USGS QA/QC
118	4015041.462	739591.845	415.590	USGS QA/QC
119	4001211.451	733590.943	457.083	USGS QA/QC
120	4006417.641	710487.157	400.788	USGS QA/QC
501	4011043.589	706746.174	472.927	Ortho QA/QC

Station	Northing (m)	Easting (m)	Ortho. Ht. (m)	Type
502	4004501.585	711249.462	431.257	Ortho QA/QC
503	4000923.036	731955.726	475.199	Ortho QA/QC
504	4002739.875	737988.585	824.732	Ortho QA/QC
505	4007148.761	743791.756	430.598	Ortho QA/QC
506	4023608.190	736325.085	372.667	Ortho QA/QC
507	4021837.224	723246.309	349.528	Ortho QA/QC
508	4035995.321	741054.094	365.017	Ortho QA/QC
509	4041487.851	761539.884	407.880	Ortho QA/QC
510	4030555.357	758108.234	329.345	Ortho QA/QC
511	4023678.785	749736.546	343.076	Ortho QA/QC
512	4036618.136	761755.314	412.577	Ortho QA/QC
513	4003681.944	735116.503	451.590	Ortho QA/QC
514	4029477.990	746899.643	531.822	Ortho QA/QC
515	4033363.184	741997.788	464.024	Ortho QA/QC
516	4030904.972	739577.714	452.932	Ortho QA/QC
517	4037505.666	762793.147	444.032	Ortho QA/QC
518	4010699.787	740774.151	406.928	Ortho QA/QC
519	4004396.831	730855.558	805.289	Ortho QA/QC
520	4043323.922	762352.418	374.725	Ortho QA/QC
1001	4008598.523	710271.638	390.162	LiDAR QA/QC
1002	4021840.166	723152.591	352.516	LiDAR QA/QC
1003	4036013.573	741005.956	369.921	LiDAR QA/QC
1004	4037332.571	748814.188	455.560	LiDAR QA/QC
1005	4041496.389	761526.730	408.198	LiDAR QA/QC
1006	4031866.049	757784.972	361.699	LiDAR QA/QC
1008	4014852.885	743976.730	424.412	LiDAR QA/QC
1009	4023415.652	736178.971	387.436	LiDAR QA/QC
1010	4003227.250	741296.810	826.618	LiDAR QA/QC
1011	4004461.610	736004.405	423.577	LiDAR QA/QC
1012	4028240.892	748259.599	538.570	LiDAR QA/QC
1013	4005788.288	724671.209	381.414	LiDAR QA/QC
1014	4004680.329	713506.694	360.836	LiDAR QA/QC

# SECTION 3

SECTION 3



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## SECTION 3: GROUND CONTROL STATION RECOVERY INFORMATION SHEETS

This section the Station Recovery Logs of each of the ground control stations established for the USGS-OSMRE Tennessee LiDAR project. Each station recovery log contains a sketch and point information.



# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 1

Operator Name: Blakes

Latitude: N 36-12-49

Julian Day: \_\_\_\_\_ Session No. 1

Longitude: W 84-42-08.3

Start Time: 4:07 End Time: 4:38

Ellip. Height: \_\_\_\_\_

Data File Name: 030811TND6

Type of Mark: 1/4" w/ cap

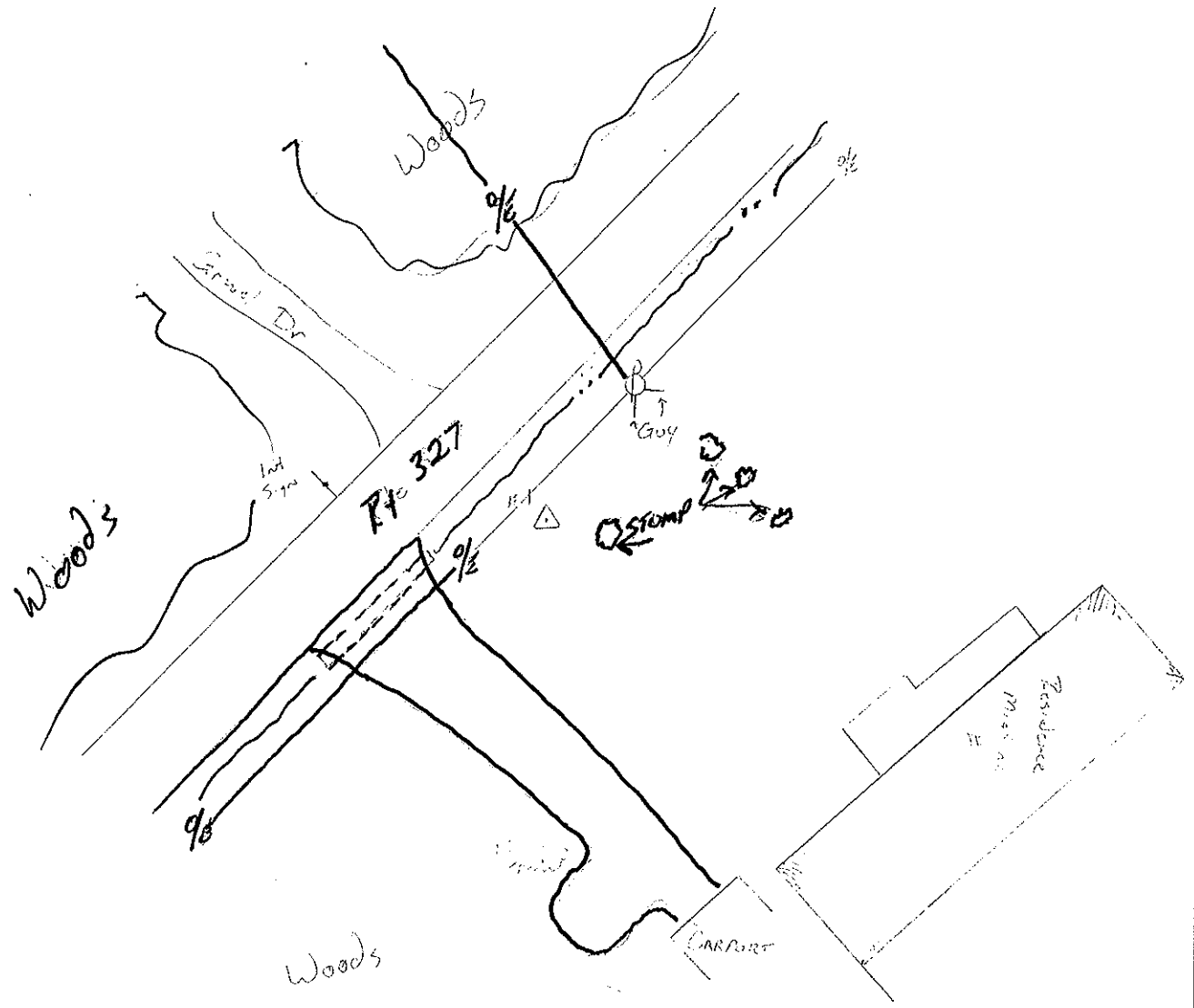
Type of Receiver: R8

Stamping on Mark: -

Type of Antenna: -

Weather Condition: RAIN

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/12/11

Station Name: Z

Operator Name: Bill Cutshall

Latitude: 36-19-15.6 N

Julian Day: 71 Session No. 5

Longitude: 84-30-34.0 W

Start Time: 8:44 End Time: 9:14

Ellip. Height: \_\_\_\_\_

Data File Name: 21120710.T01

Type of Mark: Set I. pin 2x8 panel

Type of Receiver: Trimble RB-2 4718132112

Stamping on Mark: Woolpert Inc. Control Sta.

Type of Antenna: N/A

Weather Condition: 50's sunny

Antenna Height: 2.000m to bottom of antenna mount



See sketch  
from 3/9/11





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: \_\_\_\_\_ Survey Date: 3/11/11

Station Name: 3

Operator Name: B. Baker

Latitude: N 36-19-38.4

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: N 84-22-07.8

Start Time: 3:13 End Time: 3:43

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND6

Type of Mark: 1/4" Pin w/ Cap

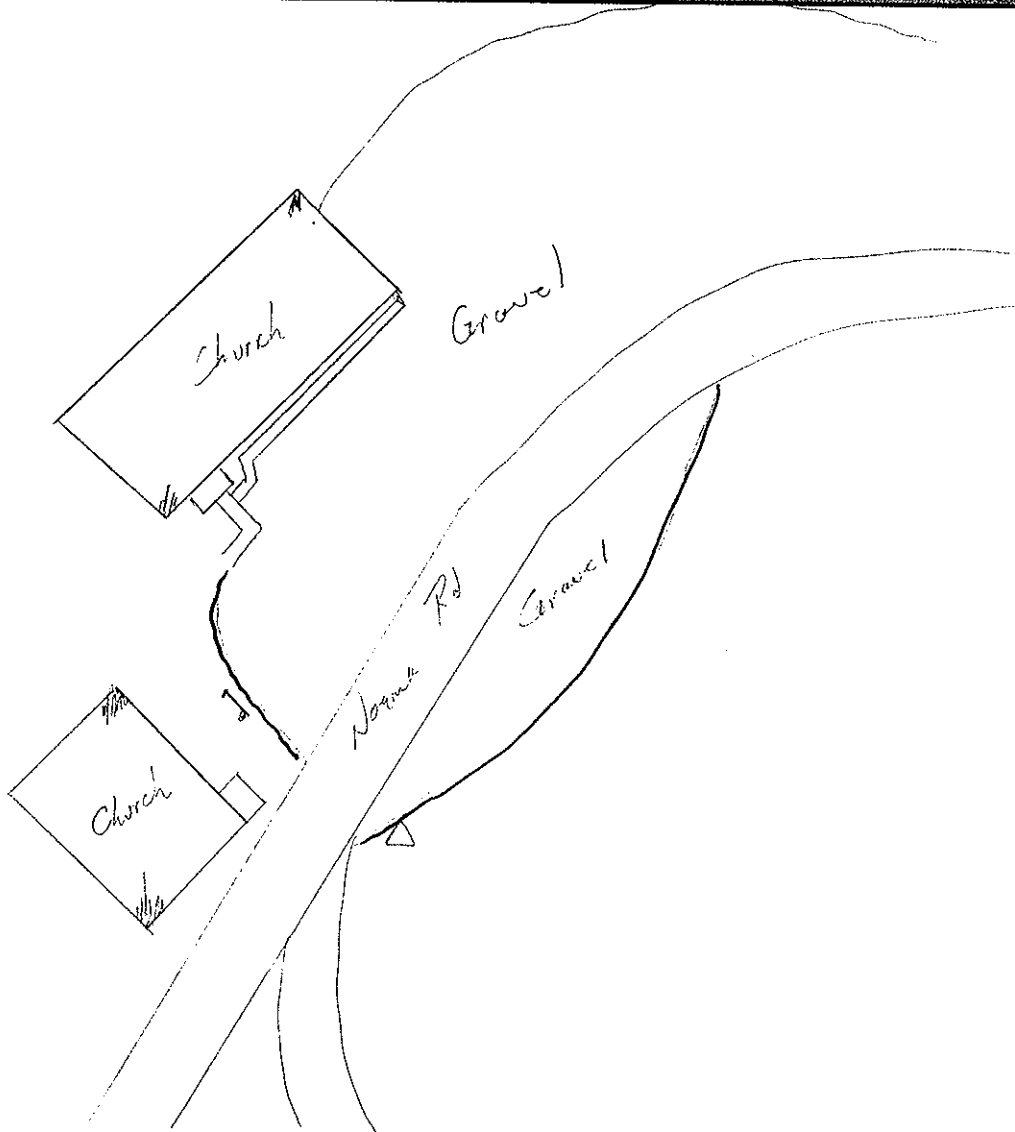
Type of Receiver: RP

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Mostly Sunny

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: 4

Operator Name: Blacken

Latitude: N 36-27-04.7

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-18-57.9

Start Time: 8:41 End Time: 9:11

Ellip. Height: \_\_\_\_\_

Data File Name: 031111Tndb

Type of Mark: 1/2 w/ cap

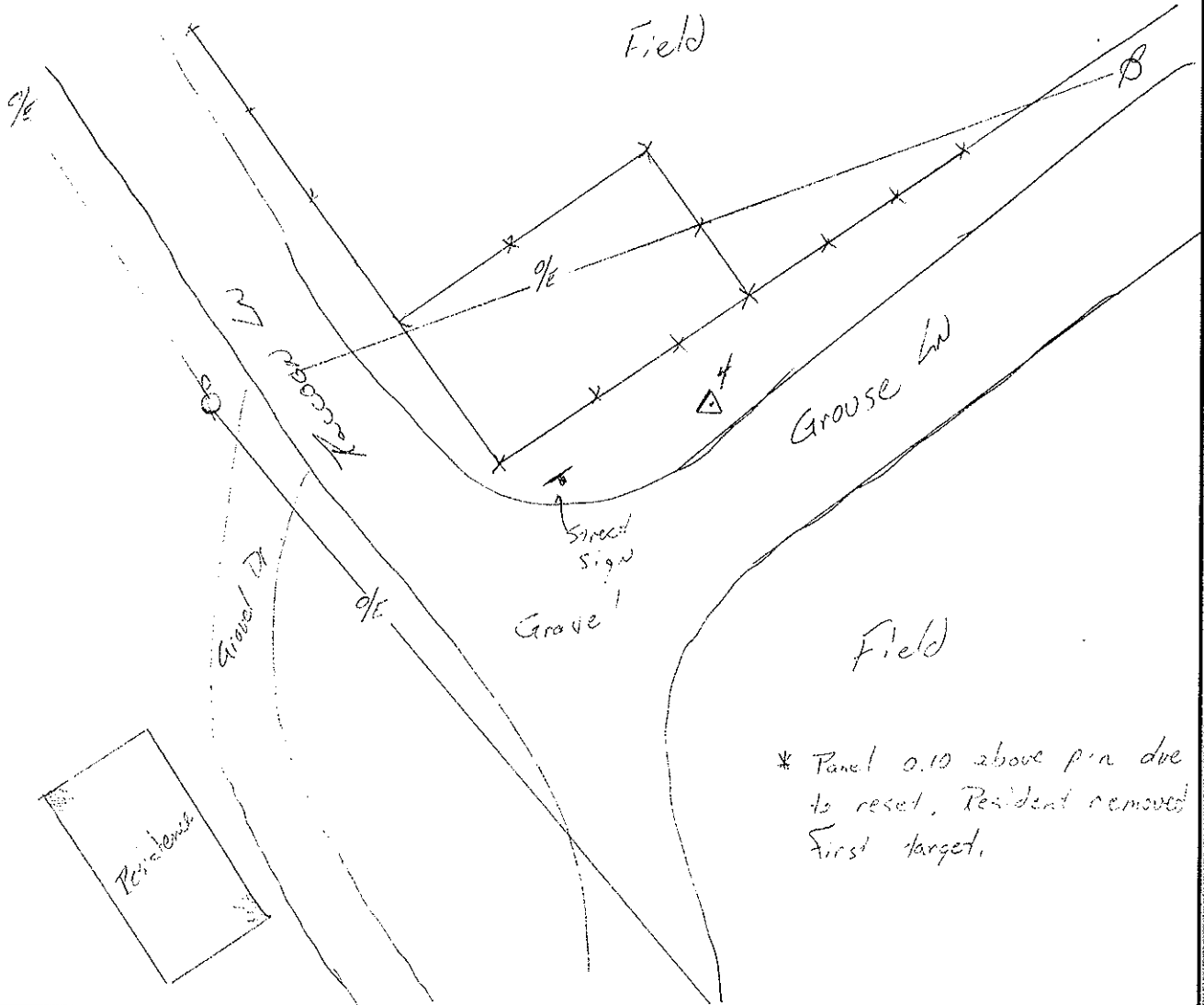
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy / cold

Antenna Height: 2.000m to bottom of antenna mount



\* Panel 0.10 above p/n due to reset, Resident removed first target.



# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 5

Operator Name: Blaker

Latitude: N 36-29-54.8

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-04-18

Start Time: 9:37 End Time: 10:07

Ellip. Height: \_\_\_\_\_

Data File Name: 031011Tndb

Type of Mark: 1/2 w/ Cap

Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

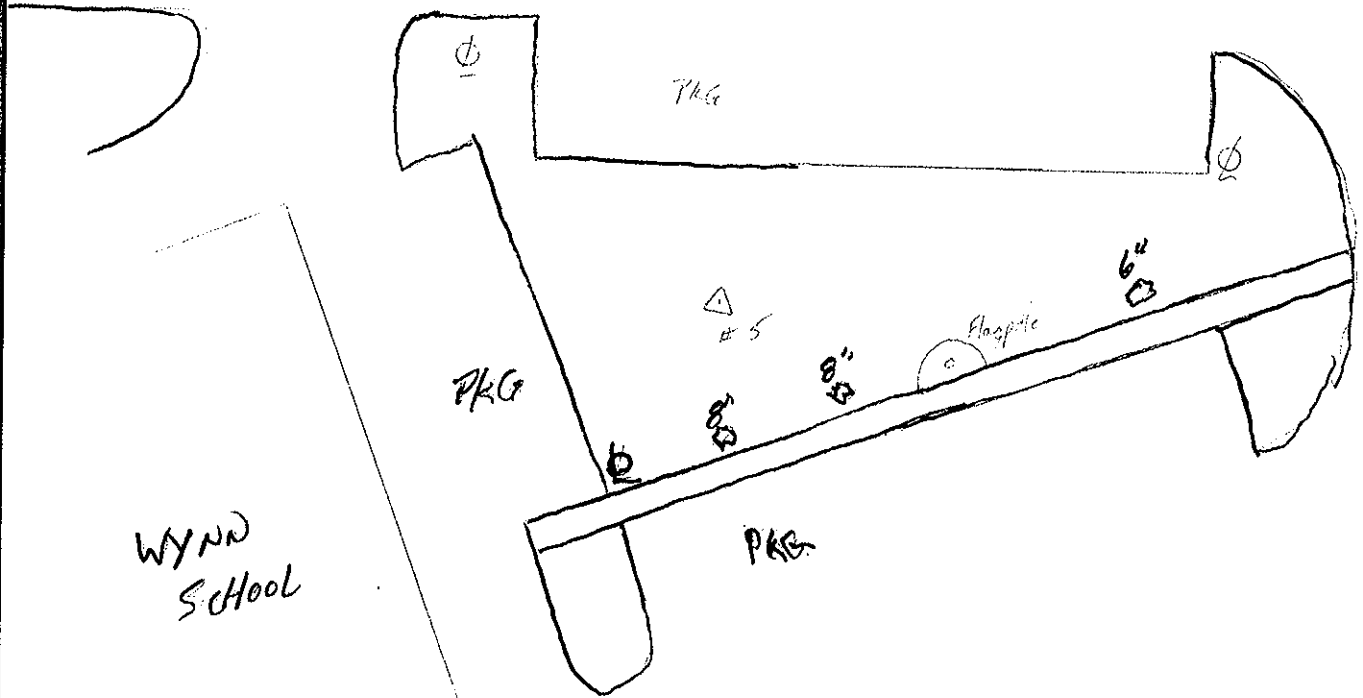
Type of Antenna: \_\_\_\_\_

Weather Condition: Run/cold

Antenna Height: 2.000m to bottom of antenna mount



Brush





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 6

Operator Name: TBaker

Latitude: N 36-24-15.5

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-05-31

Start Time: 3:30 End Time: 4:00

Ellip. Height: \_\_\_\_\_

Data File Name: 031011TND6

Type of Mark: 1/2 w/ Cap

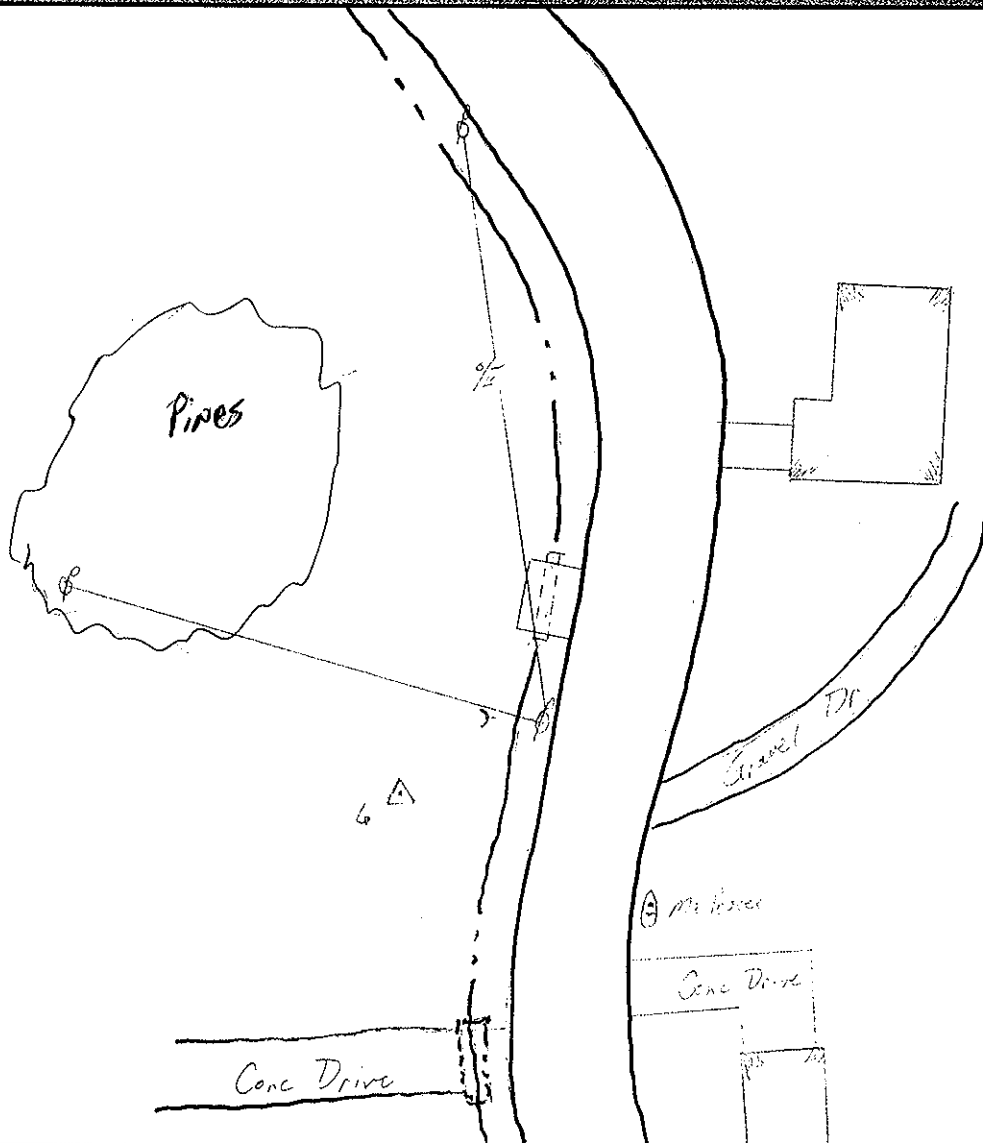
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: RAW

Antenna Height: 2.000m to bottom of antenna mount







# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/12/11

Station Name: 8

Operator Name: Bill Cutchall

Latitude: 36-07-50.5 N

Julian Day: 71 Session No. 5

Longitude: 84-20-52.6 W

Start Time: 14:50 End Time: 15:21

Ellip. Height: \_\_\_\_\_

Data File Name: 21120715.T01

Type of Mark: Set I. pin 2x8 panel Type of Receiver: Trimble R8-2 4718132112

Stamping on Mark: Woolpert Inc. Control Sta. Type of Antenna: N/A

Weather Condition: 60's sunny

Antenna Height: 2.000m to bottom of antenna mount



See sketch  
from 3/8/11



# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 9

Operator Name: Blaker

Latitude: N 36-07-32.4

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 84-25-15.4

Start Time: 2:05 End Time: 2:35

Ellip. Height: \_\_\_\_\_

Data File Name: 030911IND6

Type of Mark: 1/Plin w/ Cap

Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: RAIN

Antenna Height: 2.000m to bottom of antenna mount



Hwy Woods

TN Rt. 116

Traced Apron

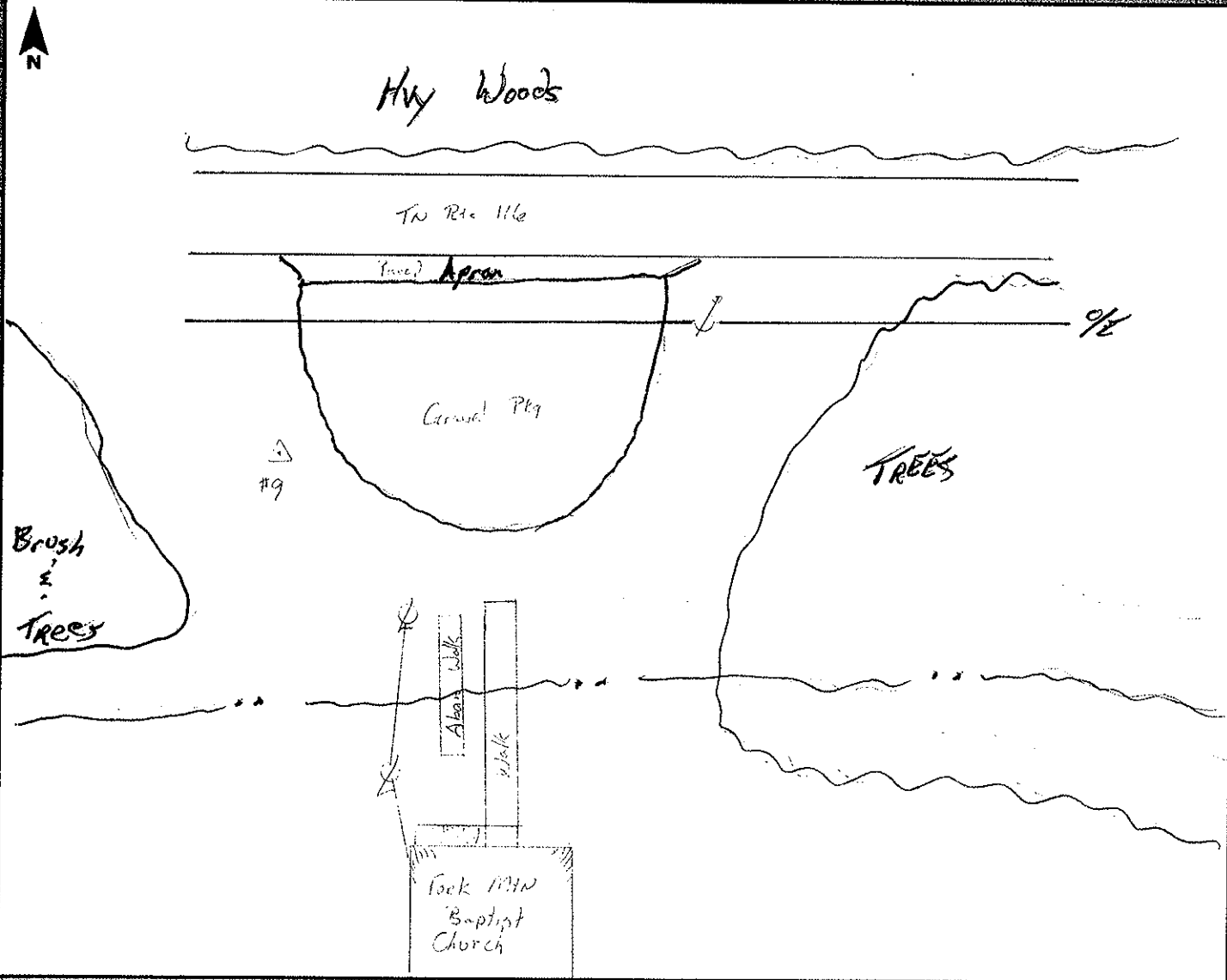
Ground Plg

#9

TREES

Brush  
&  
Trees

Fork Mt  
Baptist  
Church





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 10

Operator Name: Blaker

Latitude: N 36 08 19

Julian Day: \_\_\_\_\_ Session No. 1

Longitude: W 84 37 44.4

Start Time: 11:09 End Time: 11:39

Ellip. Height: \_\_\_\_\_

Data File Name: 030811TND6

Type of Mark: 1/2" w/ cap

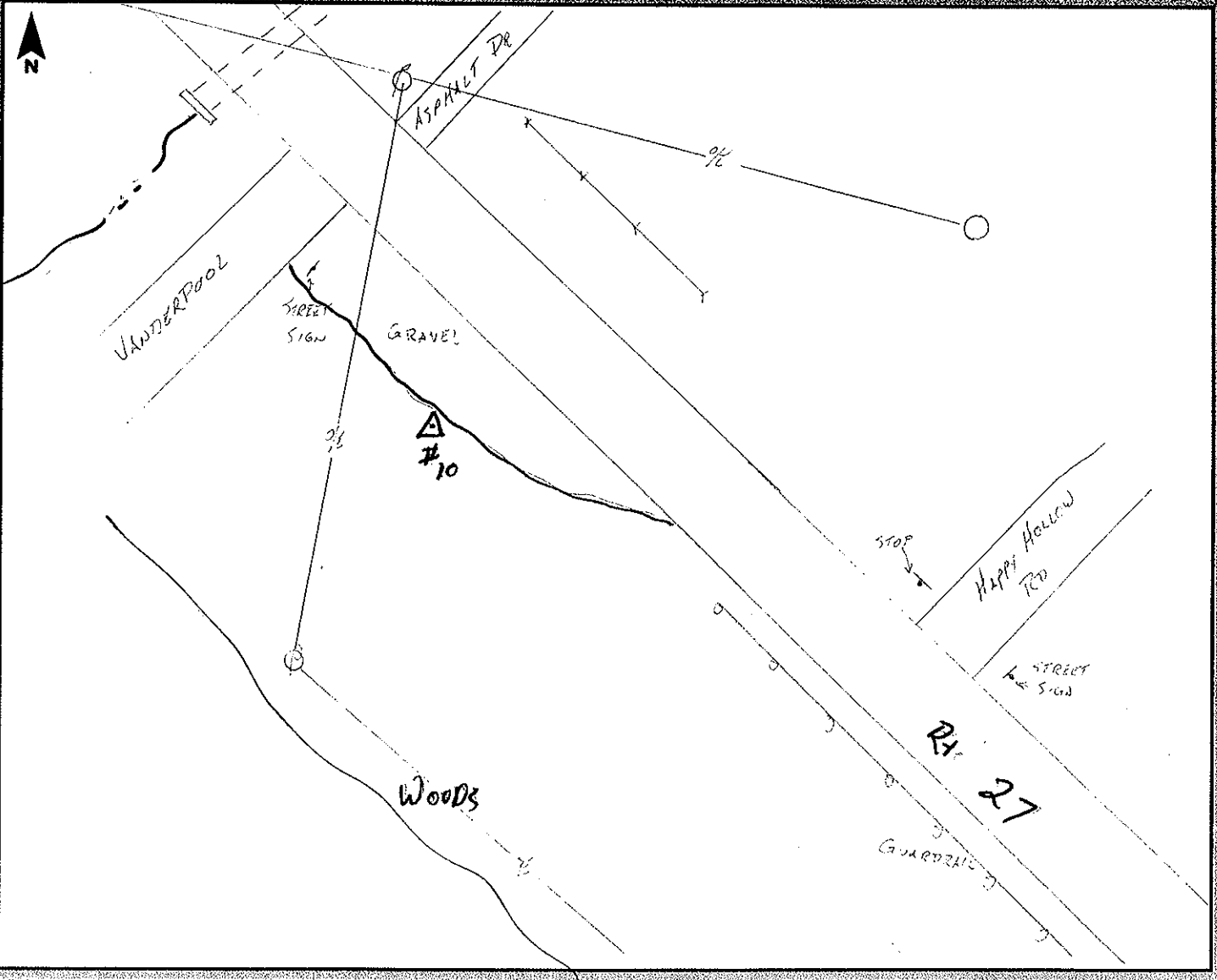
Type of Receiver: TAMBLE 28

Stamping on Mark: \_\_\_\_\_

Type of Antenna: ~

Weather Condition: Partly Cloudy

Antenna Height: 2.000m to bottom of antenna mount







# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/5/11

Station Name: 11

Operator Name: Blaker

Latitude: 36-10-33.4 N

Julian Day: \_\_\_\_\_ Session No. —

Longitude: 84-17-10.8 W

Start Time: — End Time: —

Ellip. Height: \_\_\_\_\_

Data File Name: —

Type of Mark: 1/2" PIN w/ Cap

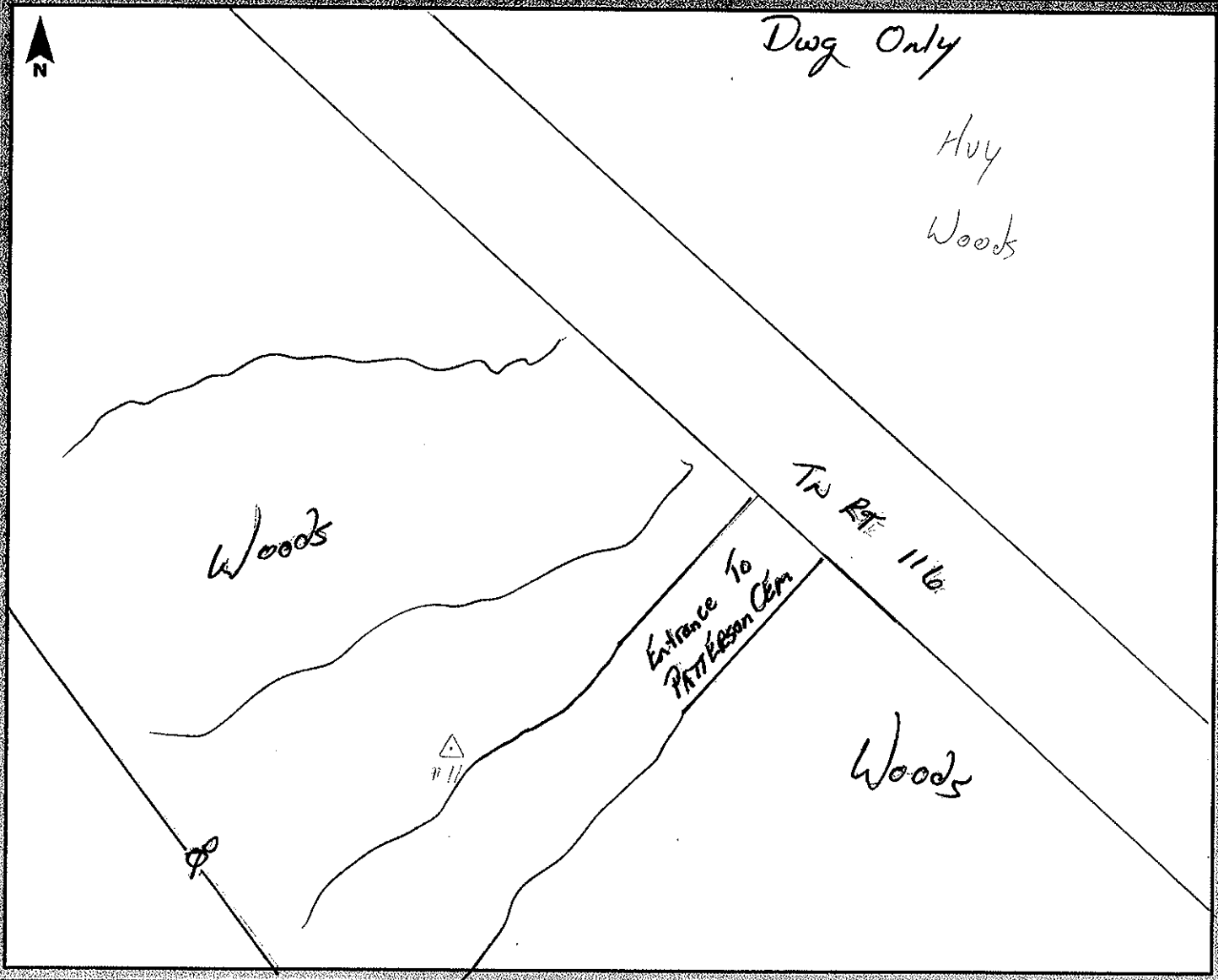
Type of Receiver: —

Stamping on Mark: —

Type of Antenna: —

Weather Condition: RAIN

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 101

Operator Name: Blaker

Latitude: N 36-13-19.7

Julian Day: \_\_\_\_\_ Session No. 1

Longitude: W 84-40-00.4

Start Time: 2:37 End Time: 3:07

Ellip. Height: \_\_\_\_\_

Data File Name: 030811 TND6

Type of Mark: G/S

Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy

Antenna Height: 2.000m to bottom of antenna mount



Cumberland  
MTN CIR

Woods

US  
27

Gravel  
Shoulder

+ G/S  
101

Pitch  
line

Woods



# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 7/278 Survey Date: 3/9/11

Station Name: 102

Operator Name: Blaker

Latitude: N 36-10-09.4

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 84-33-25.7

Start Time: 10:58 End Time: 11:49

Ellip. Height: \_\_\_\_\_

Data File Name: Blown Over 030911T16

Type of Mark: G/S

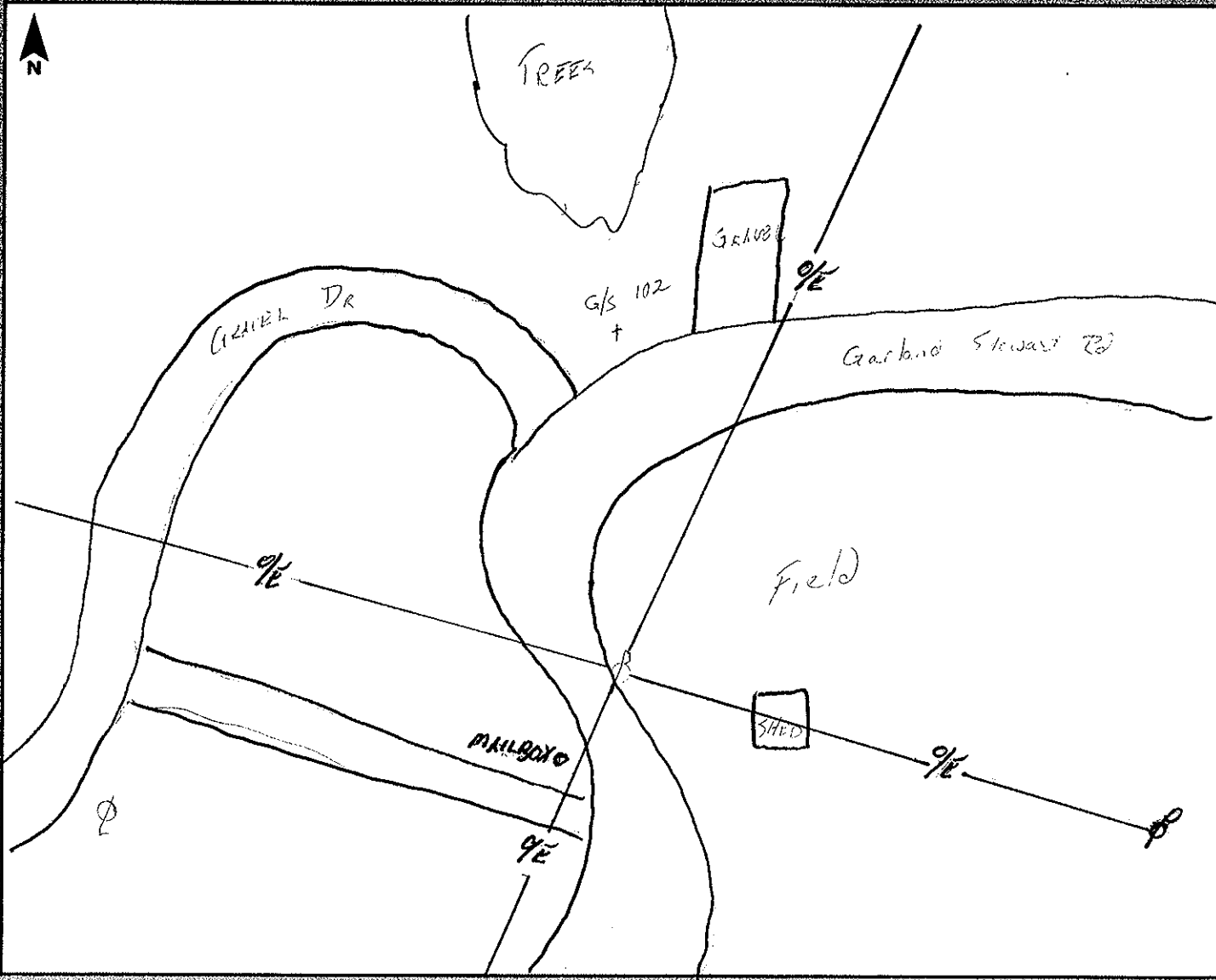
Type of Receiver: R8

Stamping on Mark: -

Type of Antenna: -

Weather Condition: RAIN / WINDS

Antenna Height: 2.000m to bottom of antenna mount



NFS



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 103

Operator Name: Bill Cutchall

Latitude: 36-15-06.1 N

Julian Day: 68 Session No. 2

Longitude: 84-27-05.0 W

Start Time: 13:05 End Time: 13:35

Ellip. Height: \_\_\_\_\_

Data File Name: 21120683.T01

Type of Mark: ground shot

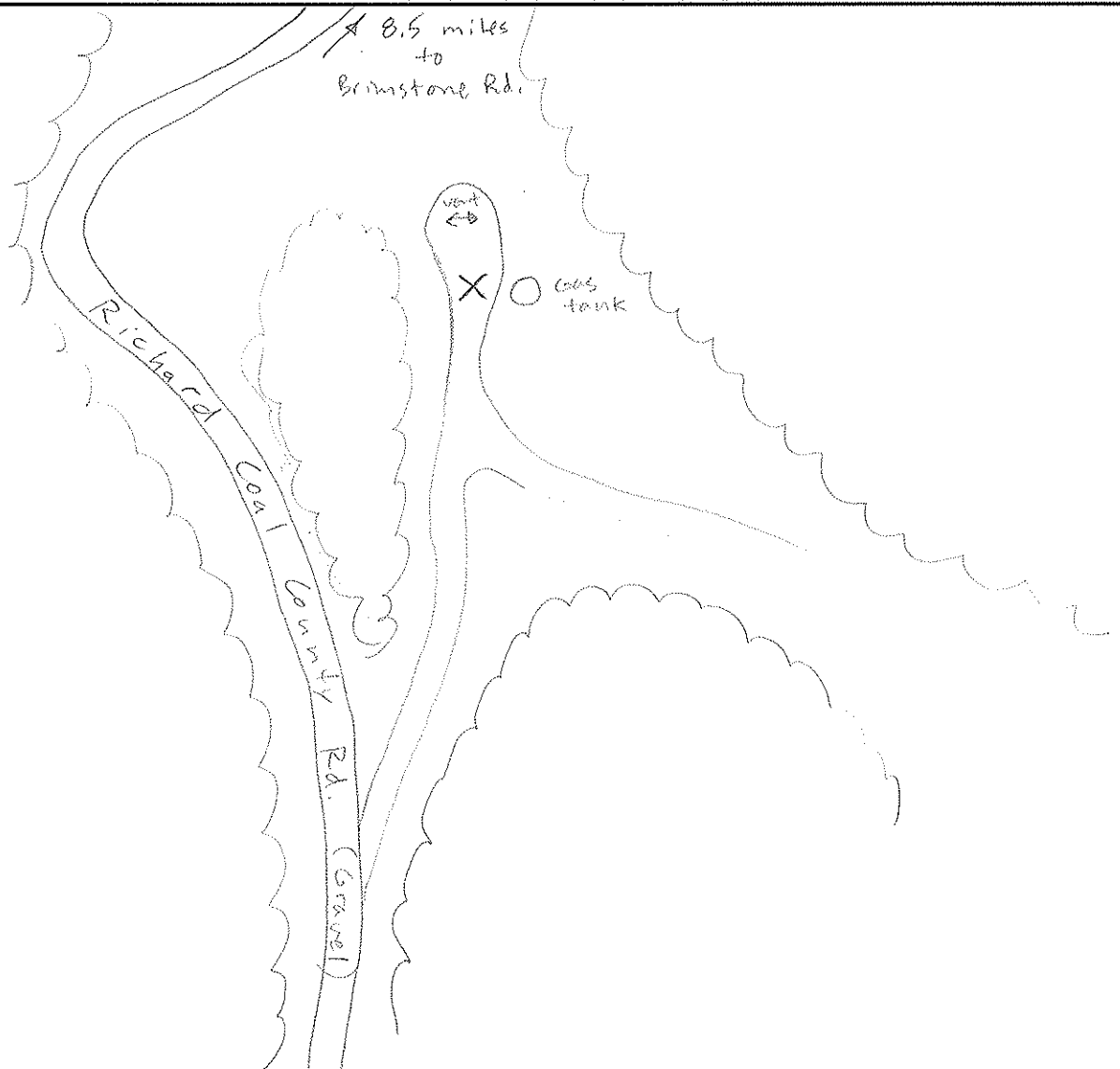
Type of Receiver: Trimble R8-2 4718132112

Stamping on Mark: gravel

Type of Antenna: N/A

Weather Condition: 50's cloudy windy

Antenna Height: 2.000m to bottom of antenna mount



E + W



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 104

Operator Name: Bill Cutshall

Latitude: 36-10-06.3 N

Julian Day: 67 Session No. 1

Longitude: 84-26-57.0 W

Start Time: 11:40 End Time: 12:08

Ellip. Height: \_\_\_\_\_

Data File Name: 21120671.T01

Type of Mark: ground shot

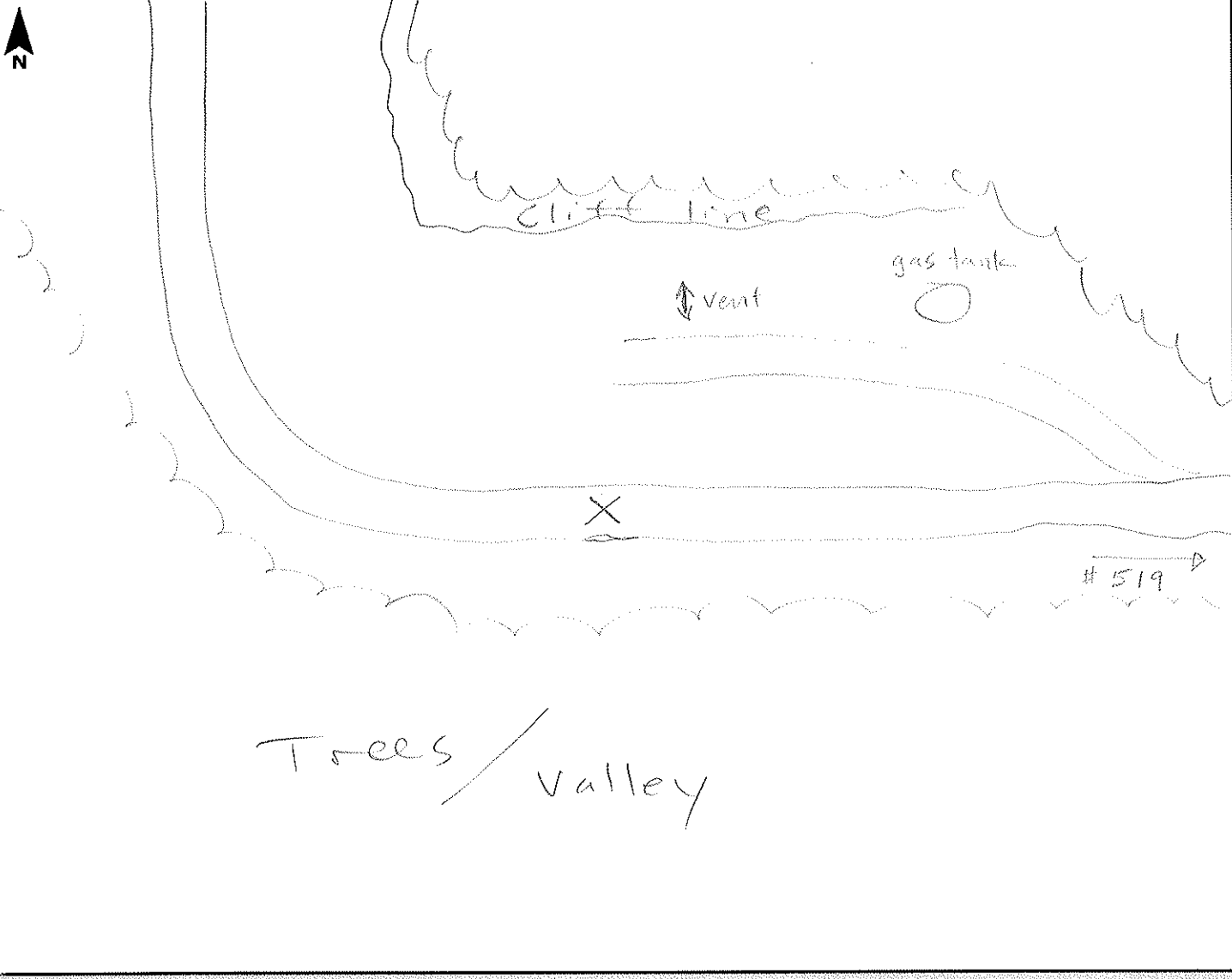
Type of Receiver: Trimble R8-2 4718132112

Stamping on Mark: \_\_\_\_\_

Type of Antenna: N/A

Weather Condition: 50's cloudy

Antenna Height: 2.000m to bottom of antenna mount



NFS



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 105

Operator Name: Bill Cutshall

Latitude: 36-12-03.7 N

Julian Day: 67 Session No. 1

Longitude: 84-28-18.7

Start Time: 12:51 End Time: 13:20

Ellip. Height: \_\_\_\_\_

Data File Name: 21120672.T01

Type of Mark: ground shot

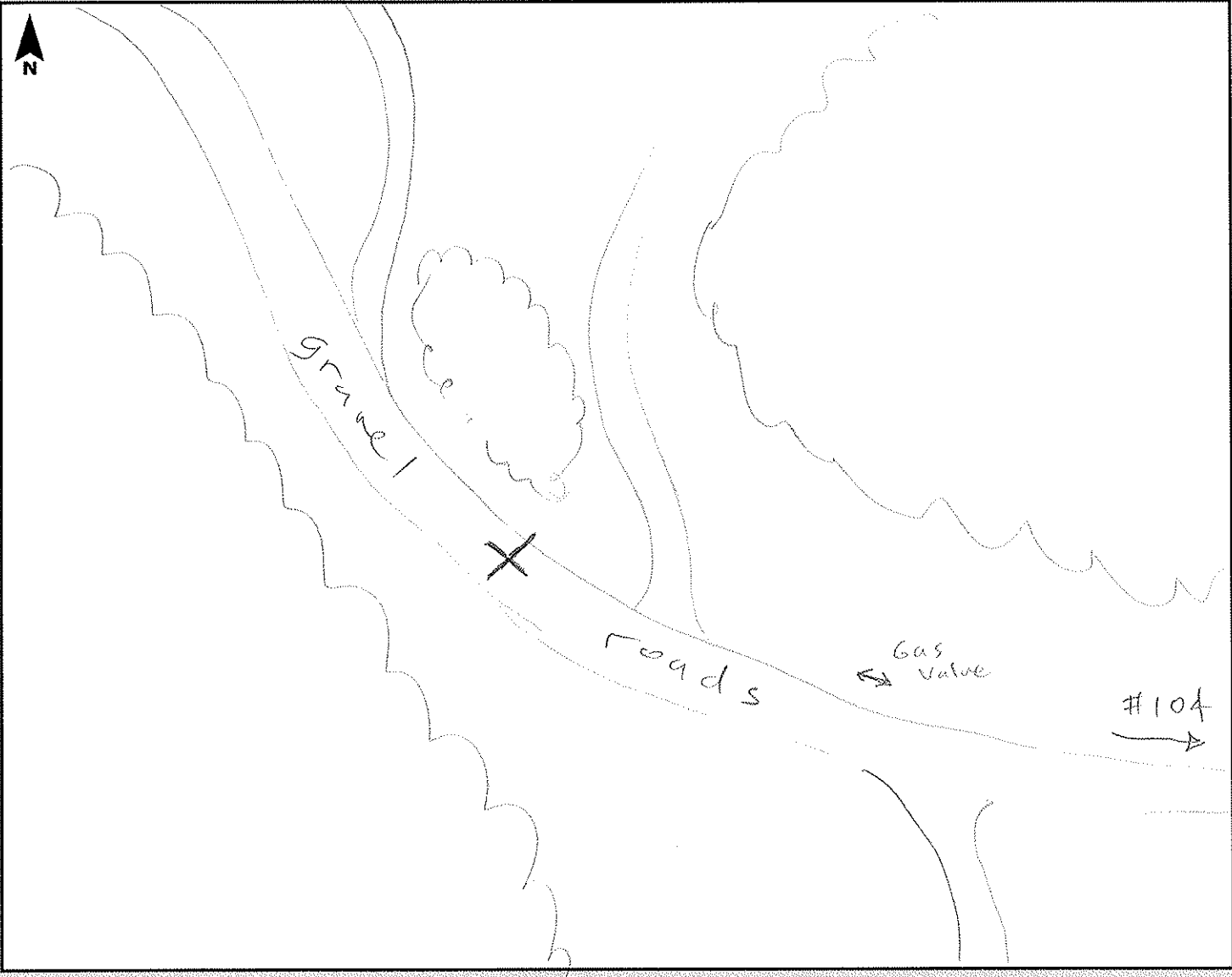
Type of Receiver: Trimble RB-2 4710132112

Stamping on Mark: \_\_\_\_\_

Type of Antenna: N/A

Weather Condition: 50's cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 106

Operator Name: Blaker

Latitude: N 36-09-02

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 84-23-06.9

Start Time: 3:24 End Time: 3:54

Ellip. Height: \_\_\_\_\_

Data File Name: 030911 TN db

Type of Mark: G/S

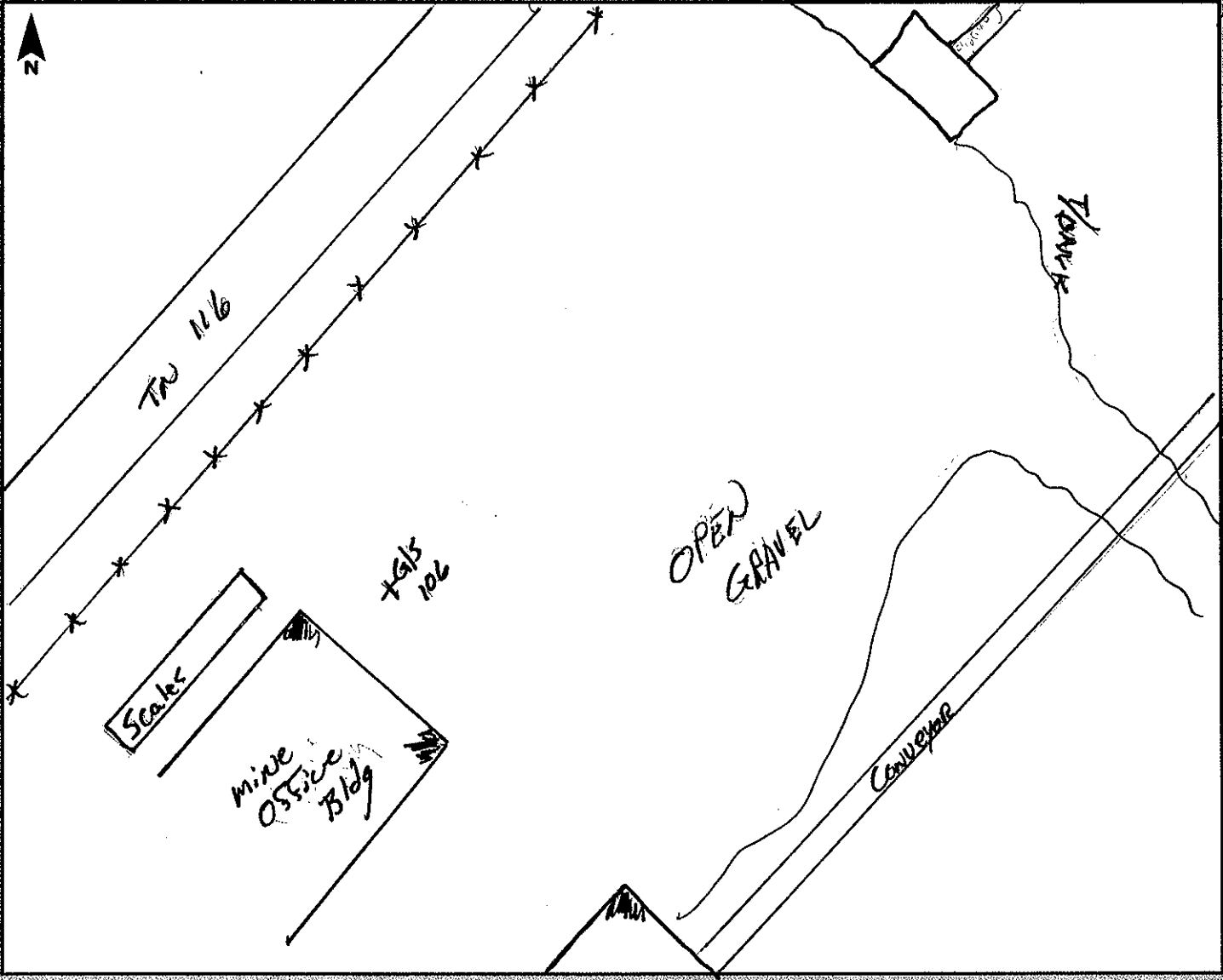
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: -

Weather Condition: Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 107

Operator Name: Bleker

Latitude: N 36-46-23

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-04-46.3

Start Time: 12:44 End Time: 1:14

Ellip. Height: \_\_\_\_\_

Data File Name: 031011TND6

Type of Mark: G/S

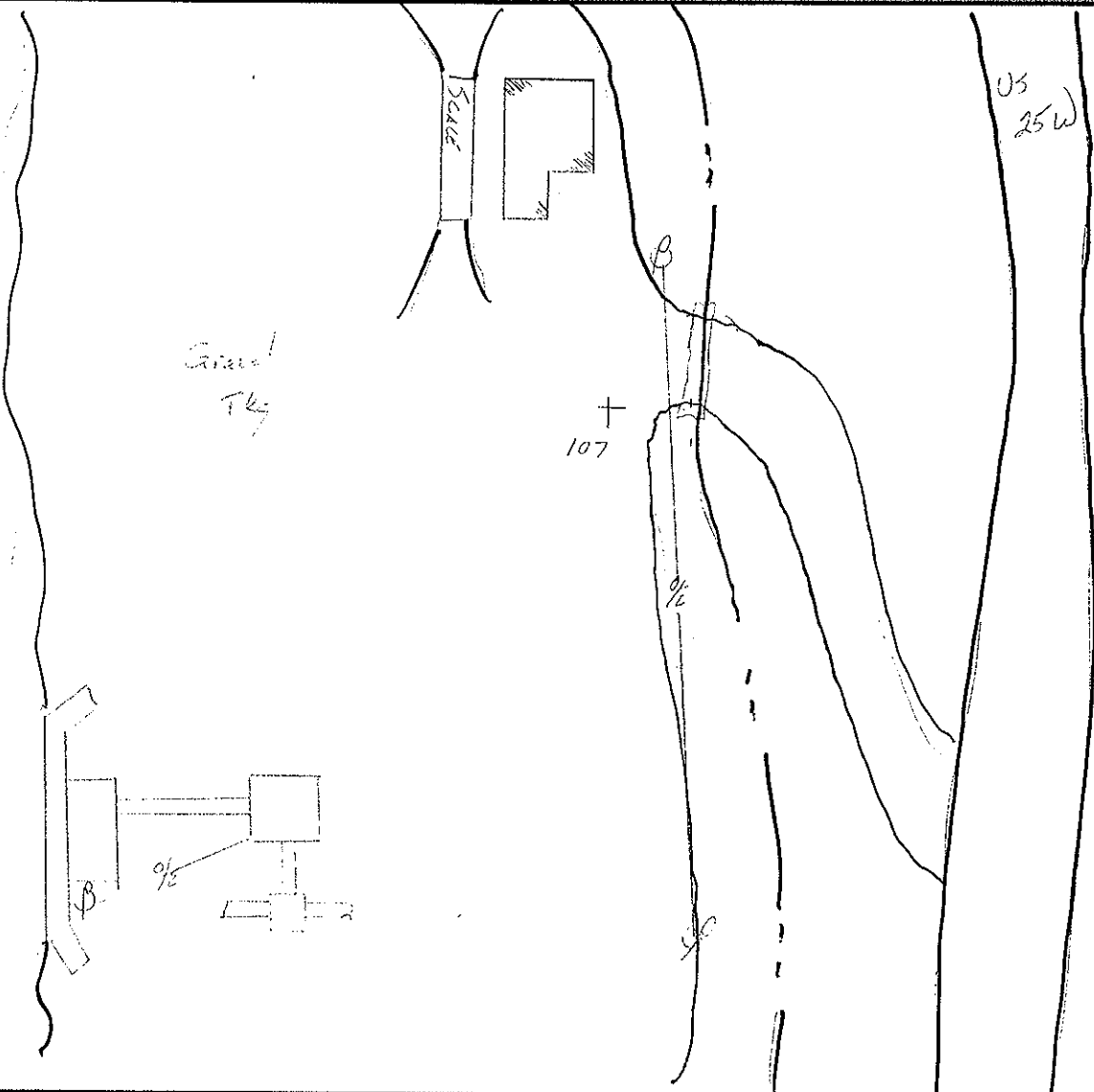
Type of Receiver: EP

Stamping on Mark: \_\_\_\_\_

Type of Antenna: -

Weather Condition: PLN

Antenna Height: 2.000m to bottom of antenna mount







# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: 108

Operator Name: Blaker

Latitude: N 36-26-34.9

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-13-54.4

Start Time: 12:47 End Time: 1:07

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND6

Type of Mark: G/S

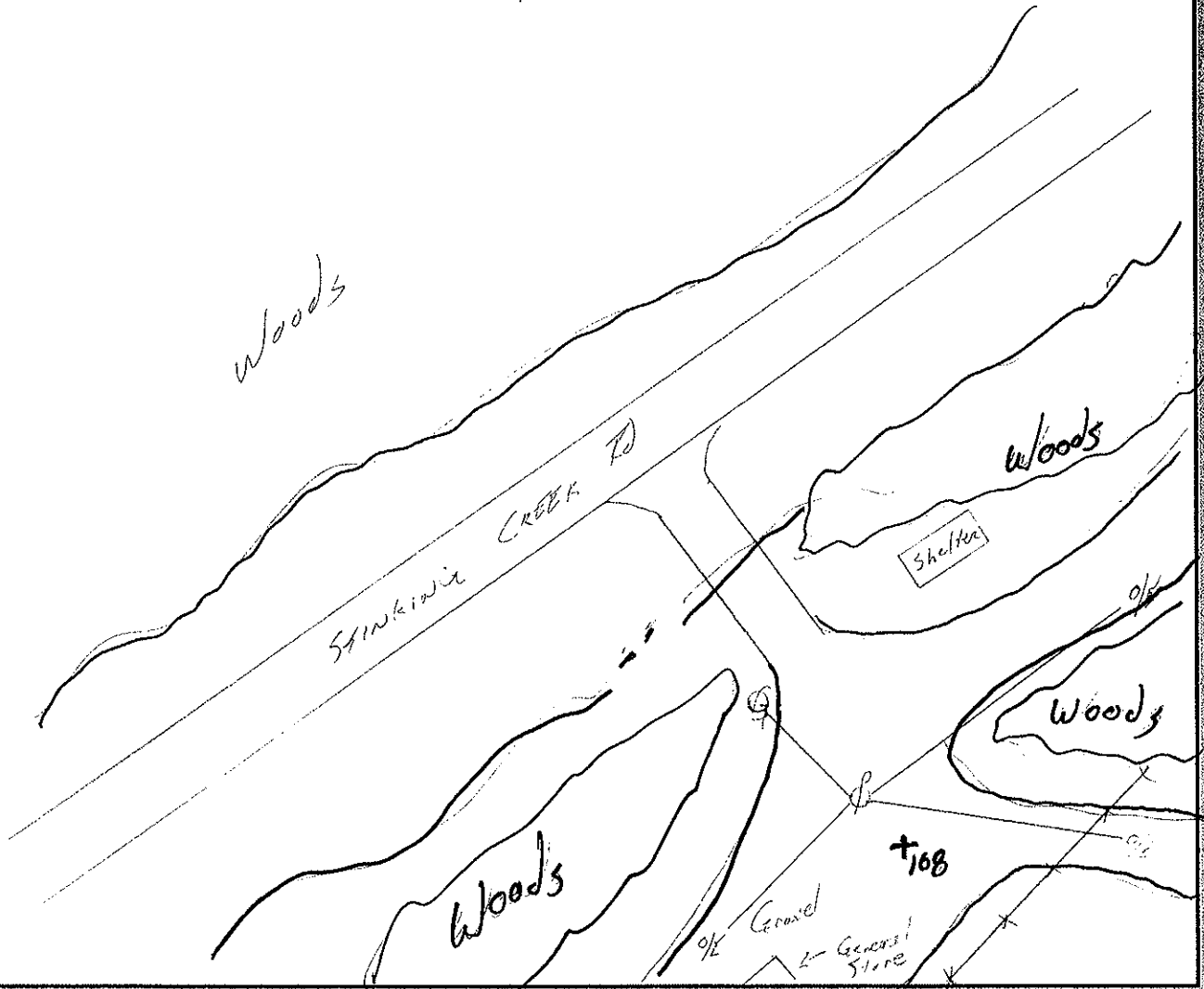
Type of Receiver: RS

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Pkly Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 03/10/11

Station Name: 109

Operator Name: Blaker

Latitude: N 36-29-54.8

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-04-18

Start Time: 11:52 End Time: 12:22

Ellip. Height: \_\_\_\_\_

Data File Name: 031011Tndb

Type of Mark: G/S

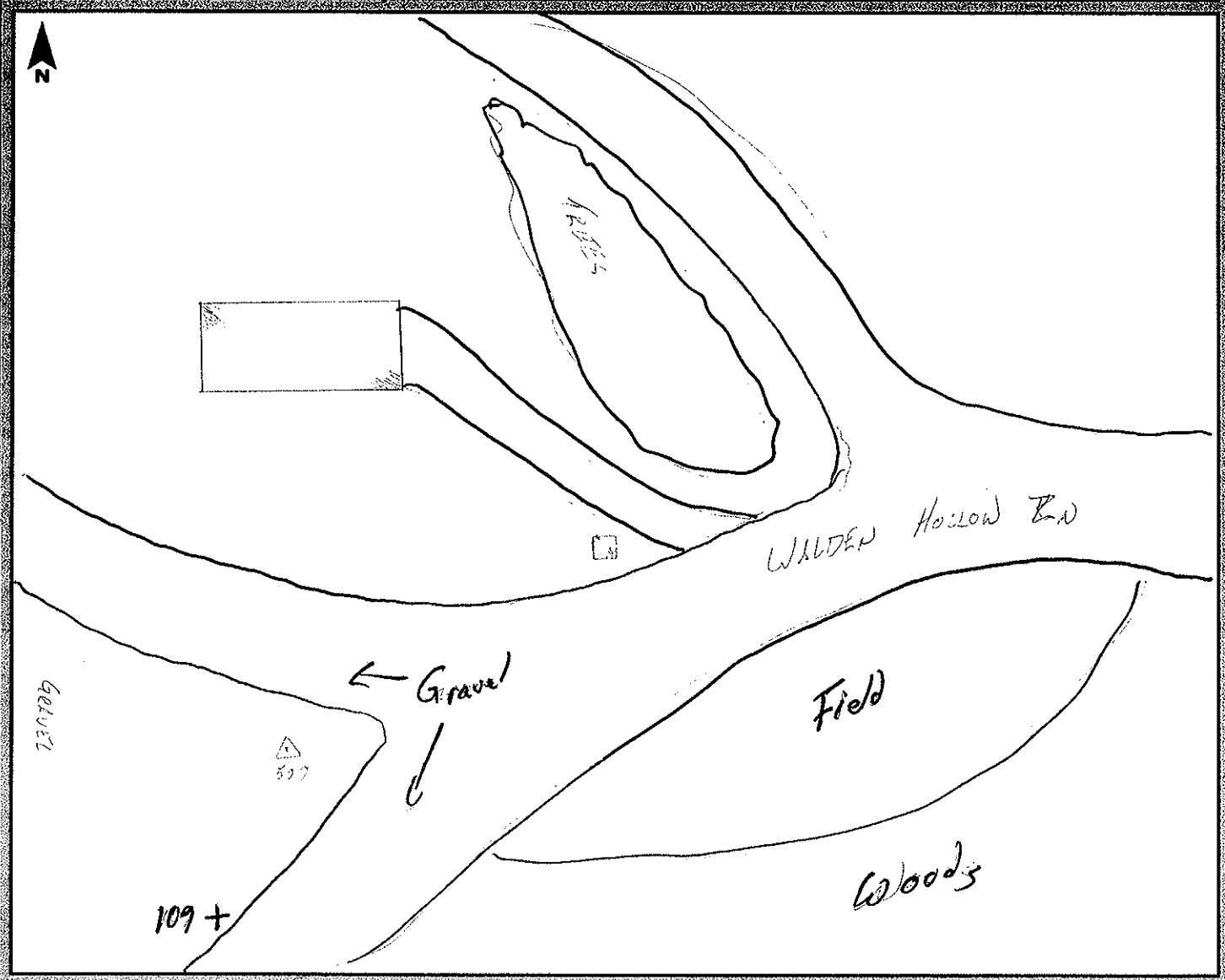
Type of Receiver: RD

Stamping on Mark: \_\_\_\_\_

Type of Antenna: -

Weather Condition: Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 7-278 Survey Date: 3/11/91

Station Name: 110

Operator Name: Blaker

Latitude: N 36-21-27.4

Julian Day: \_\_\_\_\_ Session No. 1

Longitude: W 84-13-33.6

Start Time: 6:10 End Time: 6:30

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND6

Type of Mark: G/S

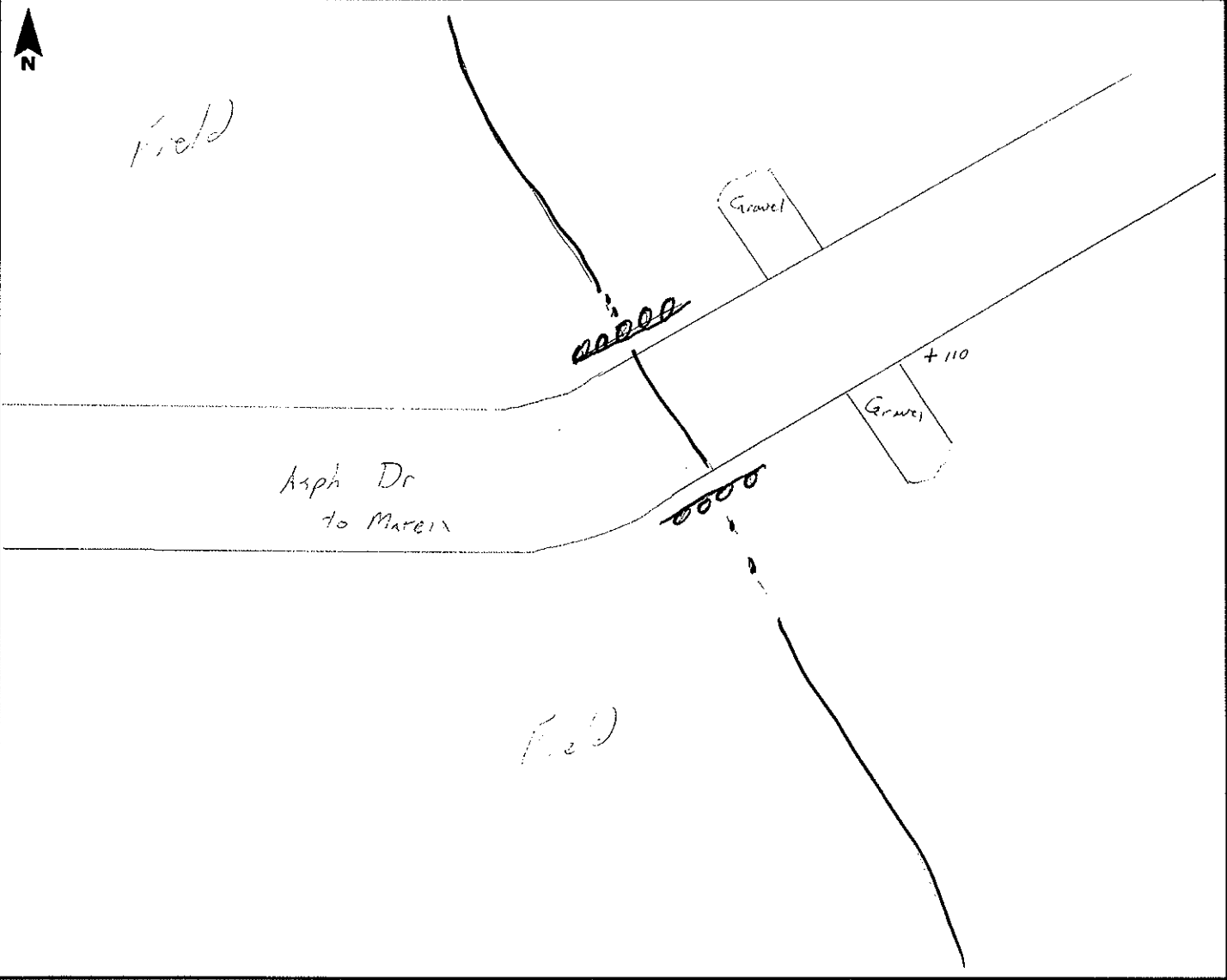
Type of Receiver: RB

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Sunny

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 111

Operator Name: Bleher

Latitude: N 34-12-40.5

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 84-19-42.2

Start Time: 5:14 End Time: 5:44

Ellip. Height: \_\_\_\_\_

Data File Name: 030911Tadd

Type of Mark: G/S

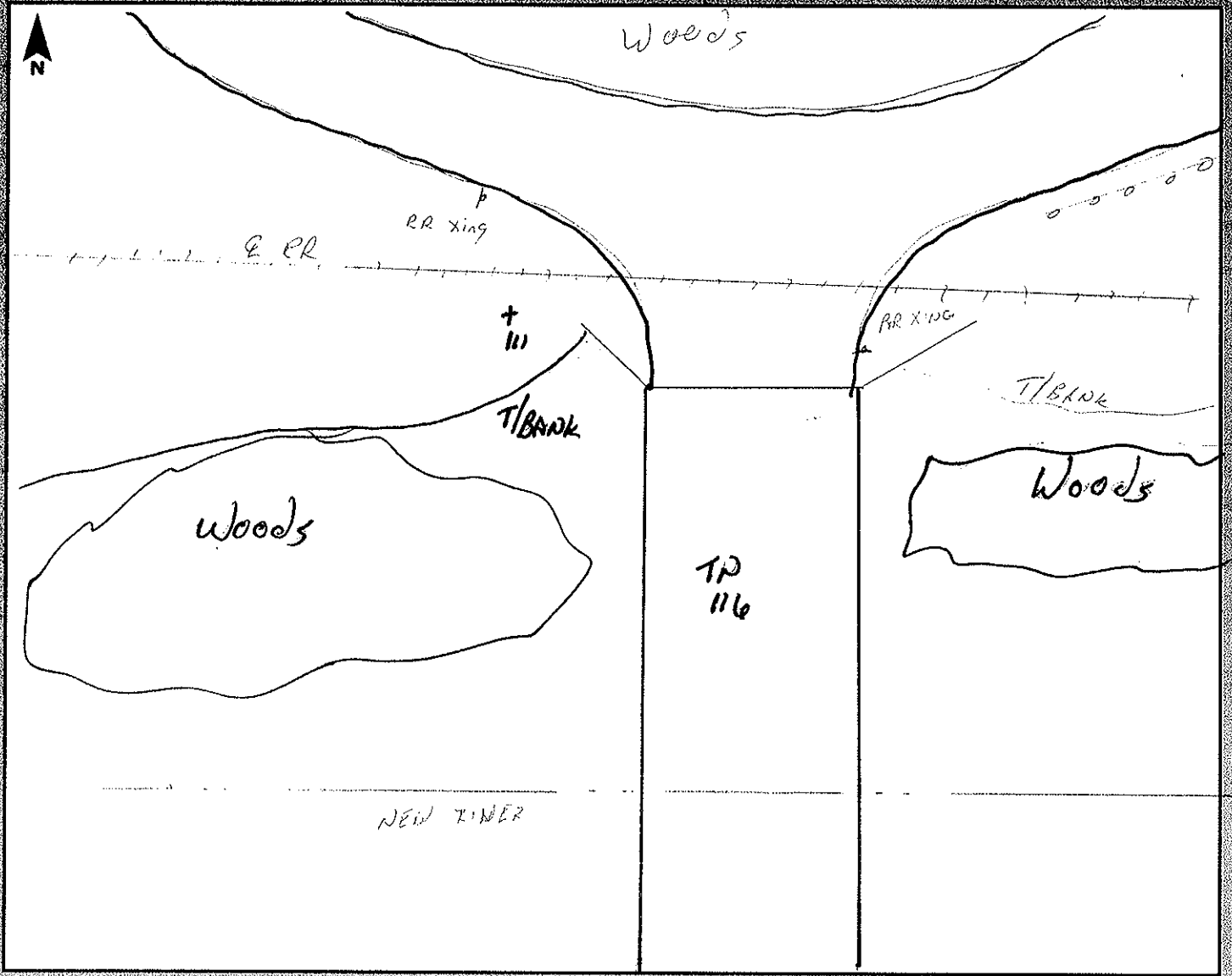
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy / Rain

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71728 Survey Date: 3/10/11

Station Name: 112

Operator Name: Blicker

Latitude: N 36-23-15.3

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-07-30.9

Start Time: 4:48 End Time: 5:18

Ellip. Height: \_\_\_\_\_

Data File Name: 031011TWdb

Type of Mark: G/S

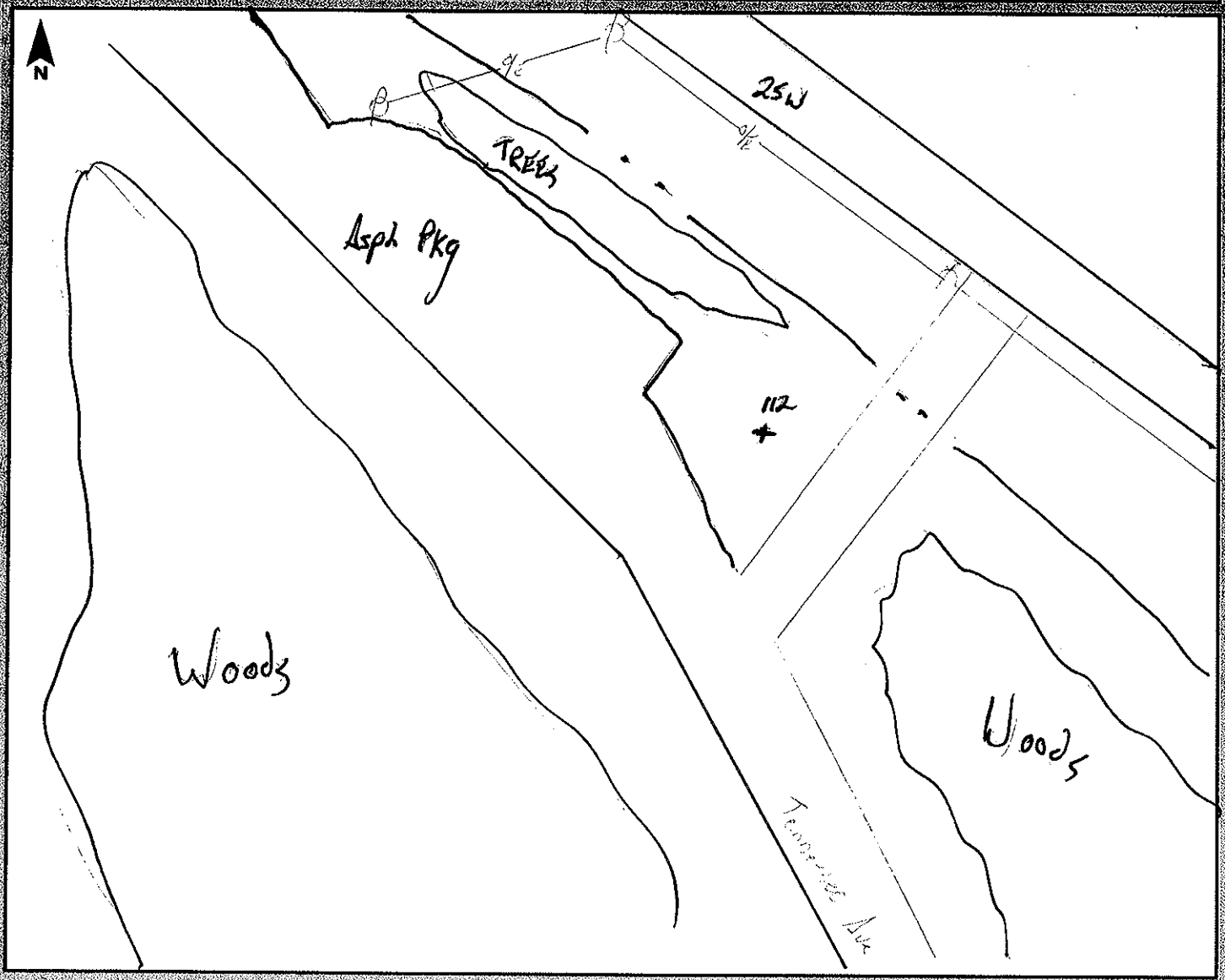
Type of Receiver: RT

Stamping on Mark: -

Type of Antenna: \_\_\_\_\_

Weather Condition: RAIN

Antenna Height: 2.000m to bottom of antenna mount



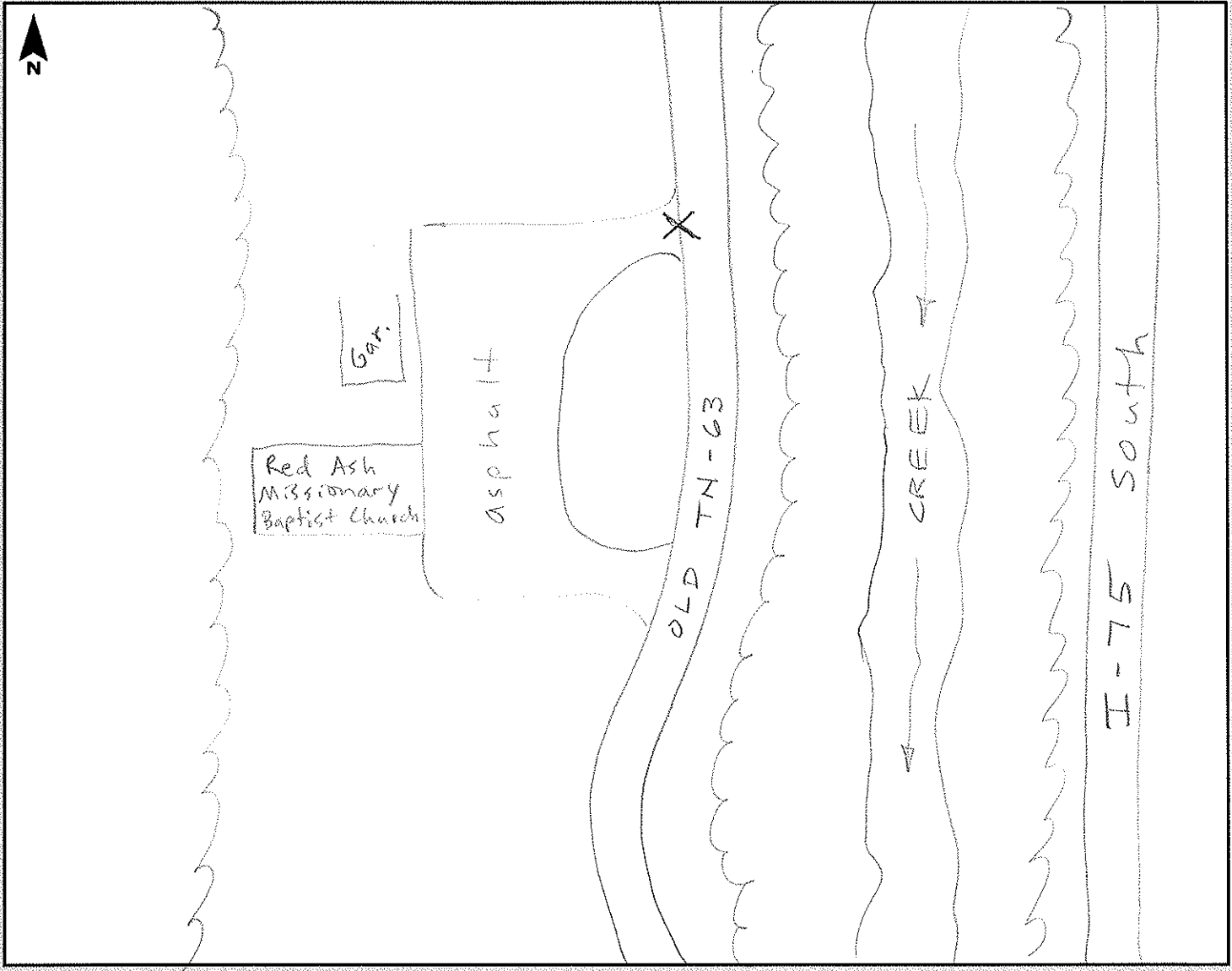
NNW + SSE



# GPS Observation Log Sheet



Project Name:	<u>Tenn. Mines</u>	Project Number:	<u>71278</u>	Survey Date:	<u>3/11/11</u>
Station Name:	<u>113</u>	Operator Name:	<u>Bill Cutshall</u>		
Latitude:	<u>36-18-40.3 N</u>	Julian Day:	<u>70</u>	Session No.:	<u>4</u>
Longitude:	<u>84-14-04.7 W</u>	Start Time:	<u>14:44</u>	End Time:	<u>15:15</u>
Ellip. Height:	<u></u>	Data File Name:	<u>Z1120704.T01</u>		
Type of Mark:	<u>ground shot</u>	Type of Receiver:	<u>Trimble R8-2 4716132112</u>		
Stamping on Mark:	<u>asphalt</u>	Type of Antenna:	<u>N/A</u>		
Weather Condition:	<u>50's clearing</u>	Antenna Height:	<u>2.000m</u>	to bottom of antenna mount	



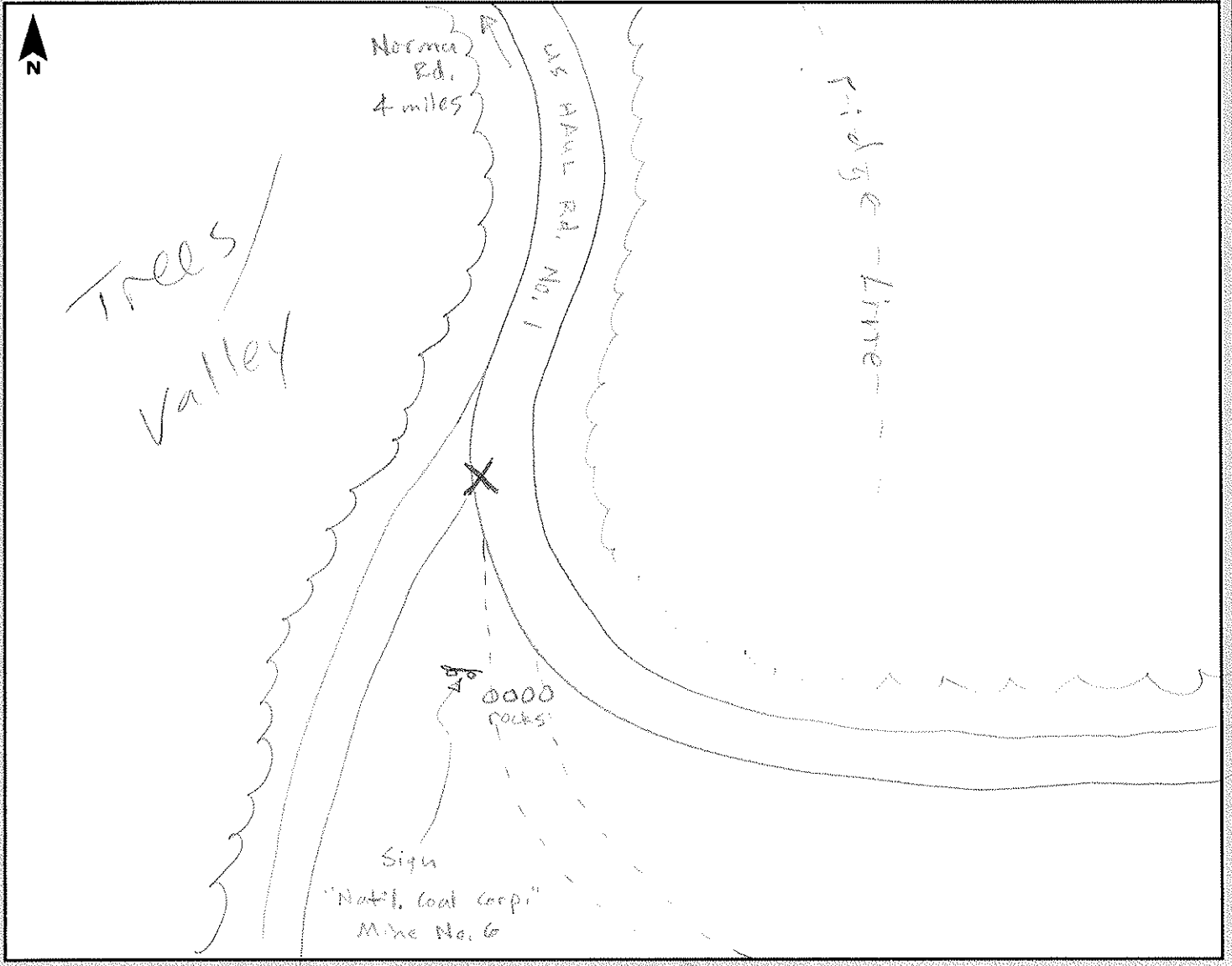
N + S



# GPS Observation Log Sheet



Project Name: <u>Tenn. Mines</u>	Project Number: <u>71278</u>	Survey Date: <u>3/11/11</u>
Station Name: <u>114</u>	Operator Name: <u>Bill Cutshall</u>	
Latitude: <u>36-17-32.8 N</u>	Julian Day: <u>70</u>	Session No. <u>4</u>
Longitude: <u>84-18-52.7 W</u>	Start Time: <u>16:56</u>	End Time: <u>17:27</u>
Ellip. Height: _____	Data File Name: <u>Z1120705.T01</u>	
Type of Mark: <u>ground shot</u>	Type of Receiver: <u>Trimble RB-2 4718132112</u>	
Stamping on Mark: <u>gravel</u>	Type of Antenna: <u>N/A</u>	
Weather Condition: <u>50's sunny</u>	Antenna Height: <u>2.000m</u>	to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: 115

Operator Name: Blaker

Latitude: N 36-23-01.8

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-15-20.5

Start Time: 10:56 End Time: 11:16

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND6

Type of Mark: G/S

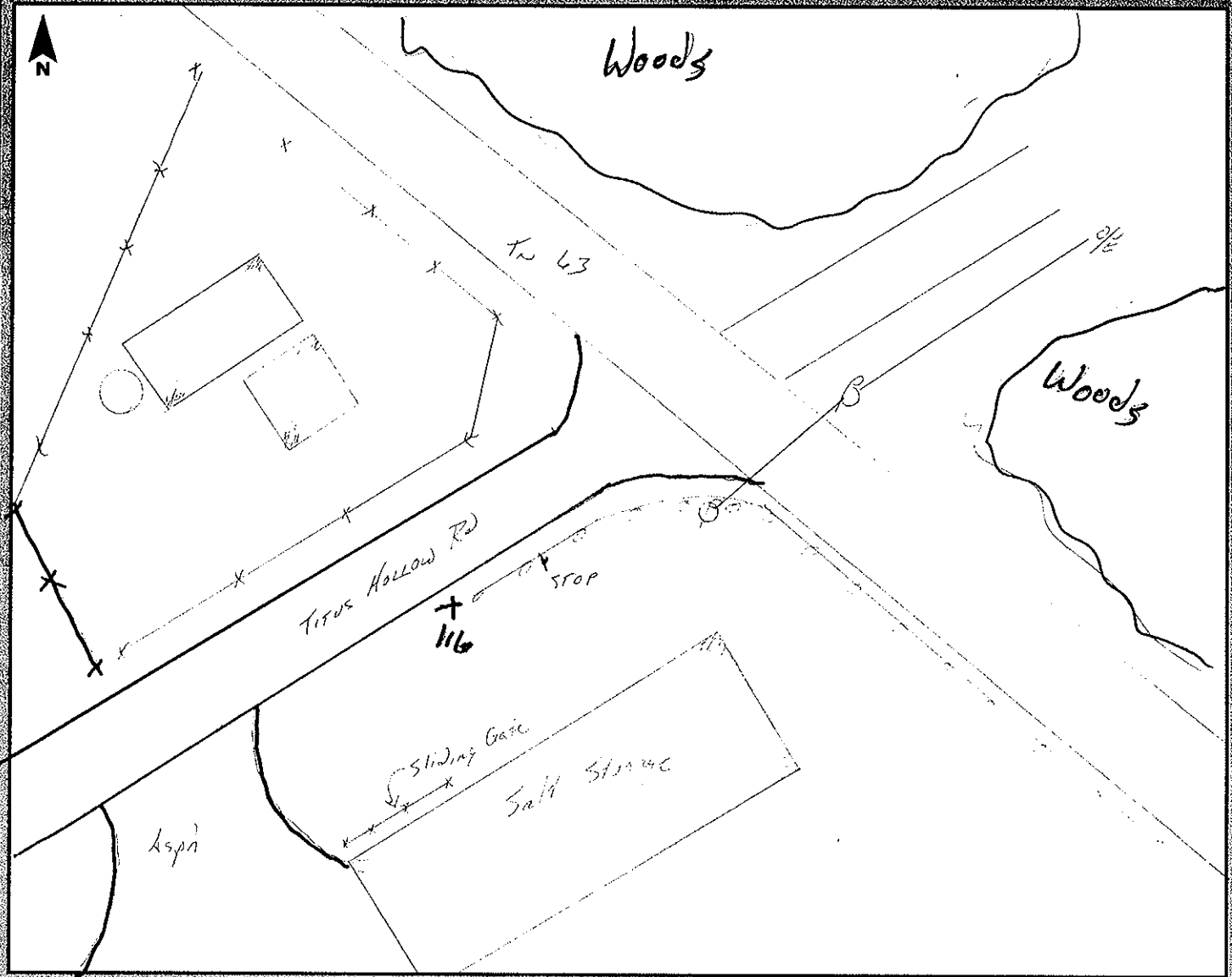
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy Windy

Antenna Height: 2.000m to bottom of antenna mount





SE + SW



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 116

Operator Name: Bill cutshall

Latitude: 36-19-08.4 N

Julian Day: 68 Session No. 2

Longitude: 84-26-43.8 W

Start Time: 15:13 End Time: 15:43

Ellip. Height: \_\_\_\_\_

Data File Name: 21120684.T01

Type of Mark: ground shot

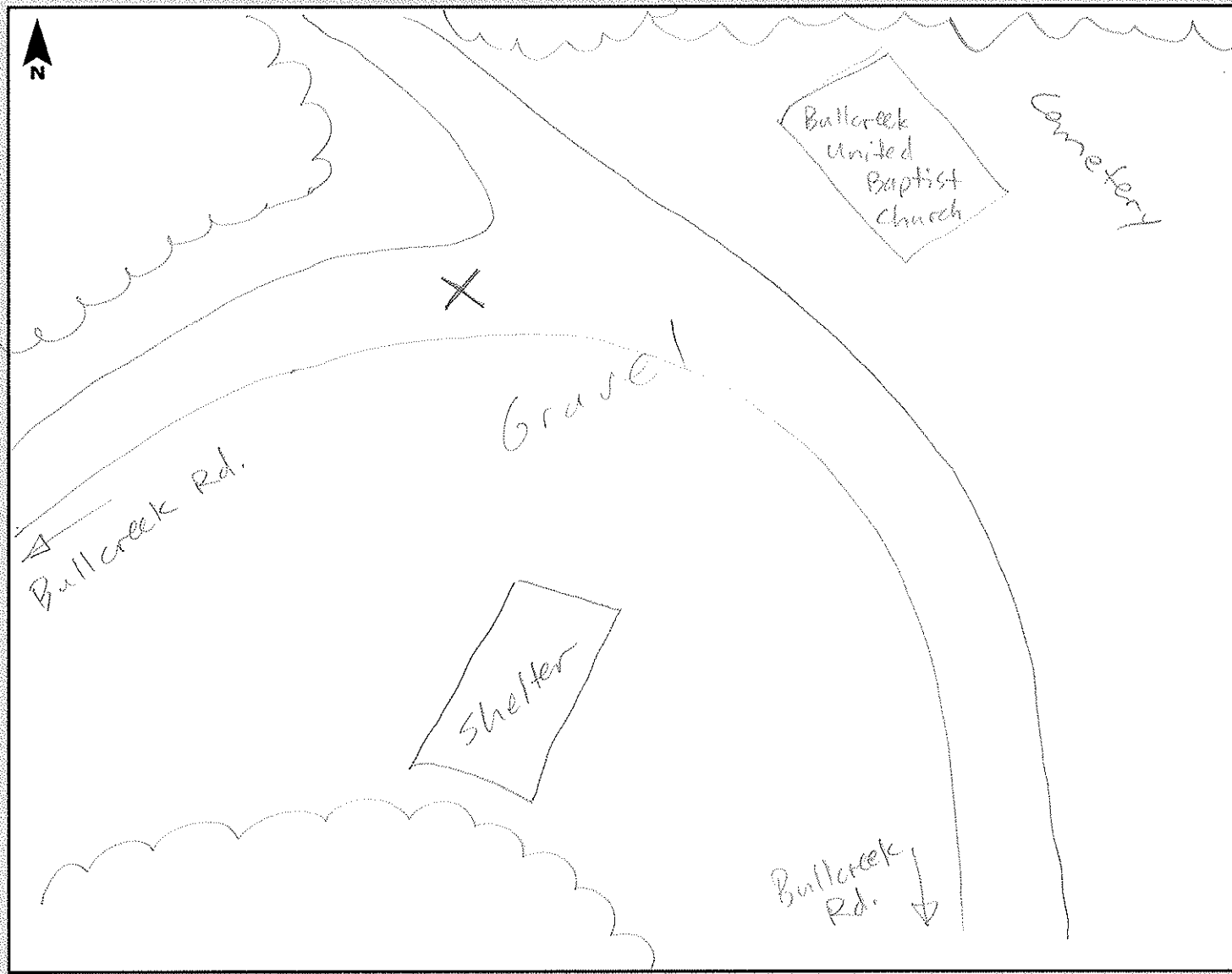
Type of Reciever: Trimble R8-2 4710132112

Stamping on Mark: gravel

Type of Antenna: N/A

Weather Condition: 50's cloudy windy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: 117

Operator Name: Bleker

Latitude: N 36-23-35.7

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-19-43.7

Start Time: 2:31 End Time: 2:51

Ellip. Height: \_\_\_\_\_

Data File Name: 031111Tddb

Type of Mark: G/S

Type of Receiver: RP

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Mostly Sunny

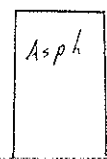
Antenna Height: 2.000m to bottom of antenna mount



Woods

Field

County Sign



Fire Sign

+117

US 63

Woods

SW + NE



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 118

Operator Name: Bill Curtshall

Latitude: 36-15-02.2 N

Julian Day: 69 Session No. 3

Longitude: 84-20-00.4 W

Start Time: 11:58 End Time: 12:29

Ellip. Height: \_\_\_\_\_

Data File Name: 21120692.T01

Type of Mark: ground shot

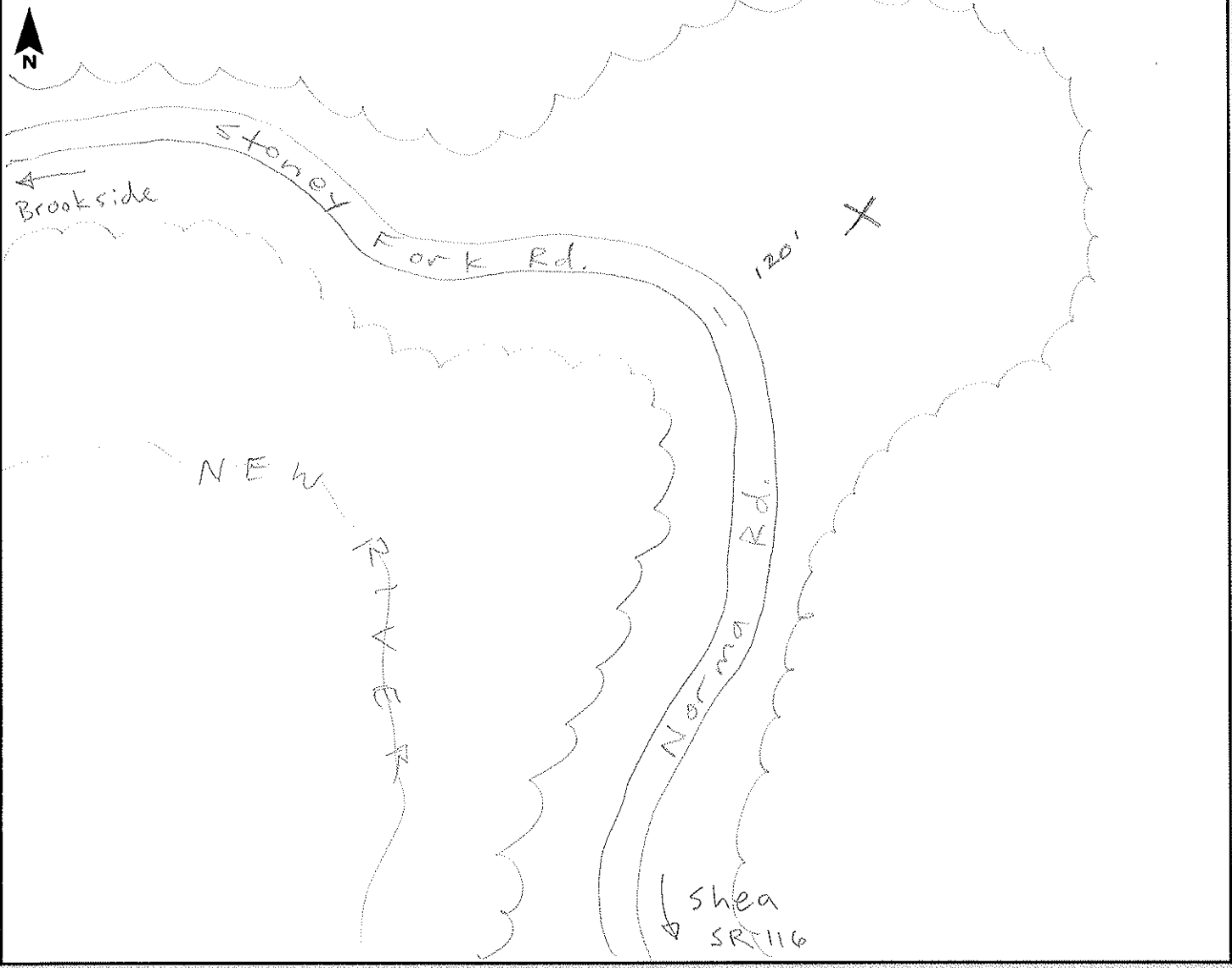
Type of Receiver: Trimble R8-2 4718132112

Stamping on Mark: dirt

Type of Antenna: N/A

Weather Condition: 50's Raining

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tona Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 119

Operator Name: Blobu

Latitude: N 36-07-58.9

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 84-24-15.3

Start Time: 2:40 End Time: 3:10

Ellip. Height: \_\_\_\_\_

Data File Name: 030911 TN db

Type of Mark: G/S

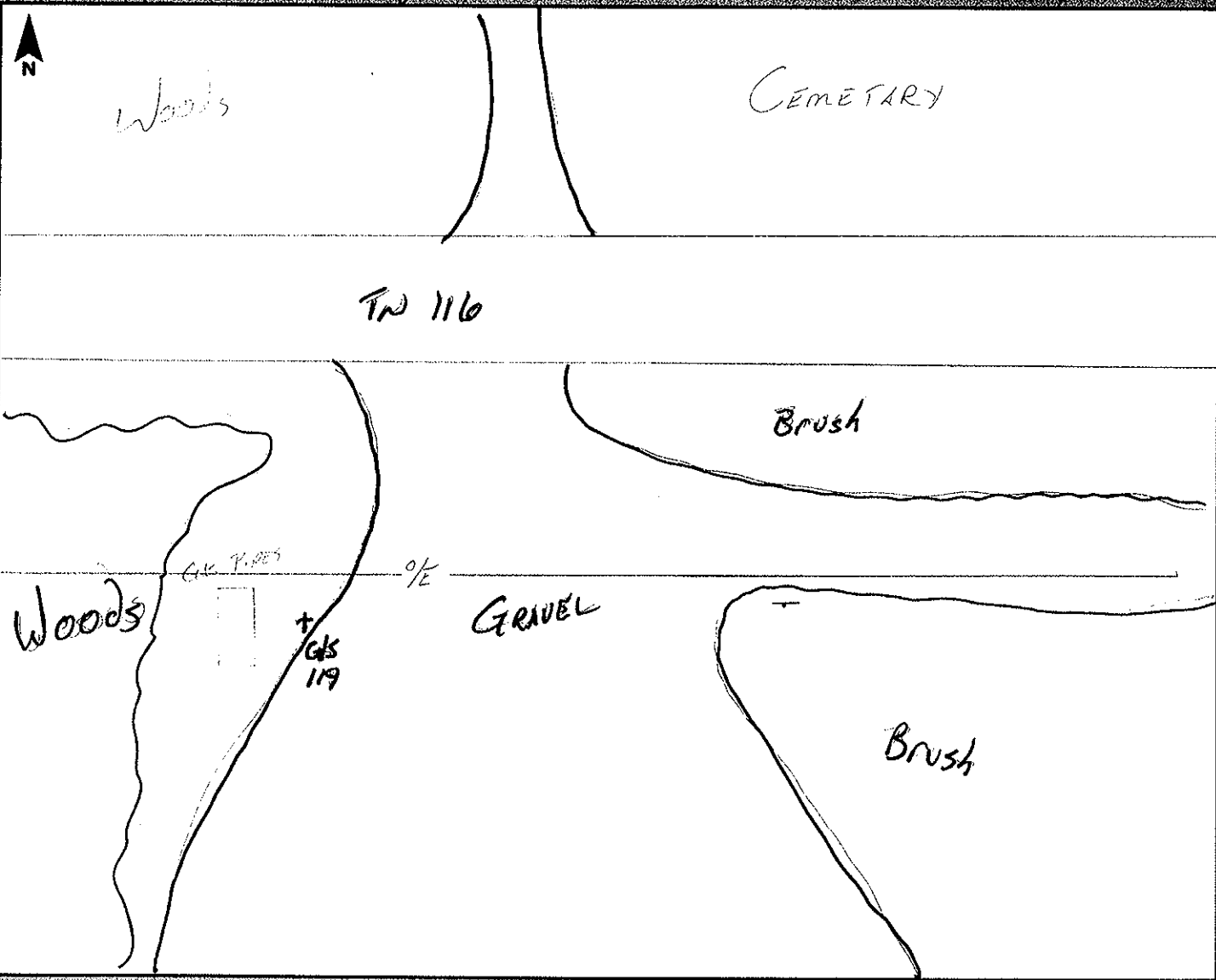
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 120

Operator Name: Blaker

Latitude: N 36-10-47.2

Julian Day: \_\_\_\_\_ Session No. 1

Longitude: W 84-39-34

Start Time: 109 End Time: 1:39

Ellip. Height: \_\_\_\_\_

Data File Name: 030811TND6

Type of Mark: G/S

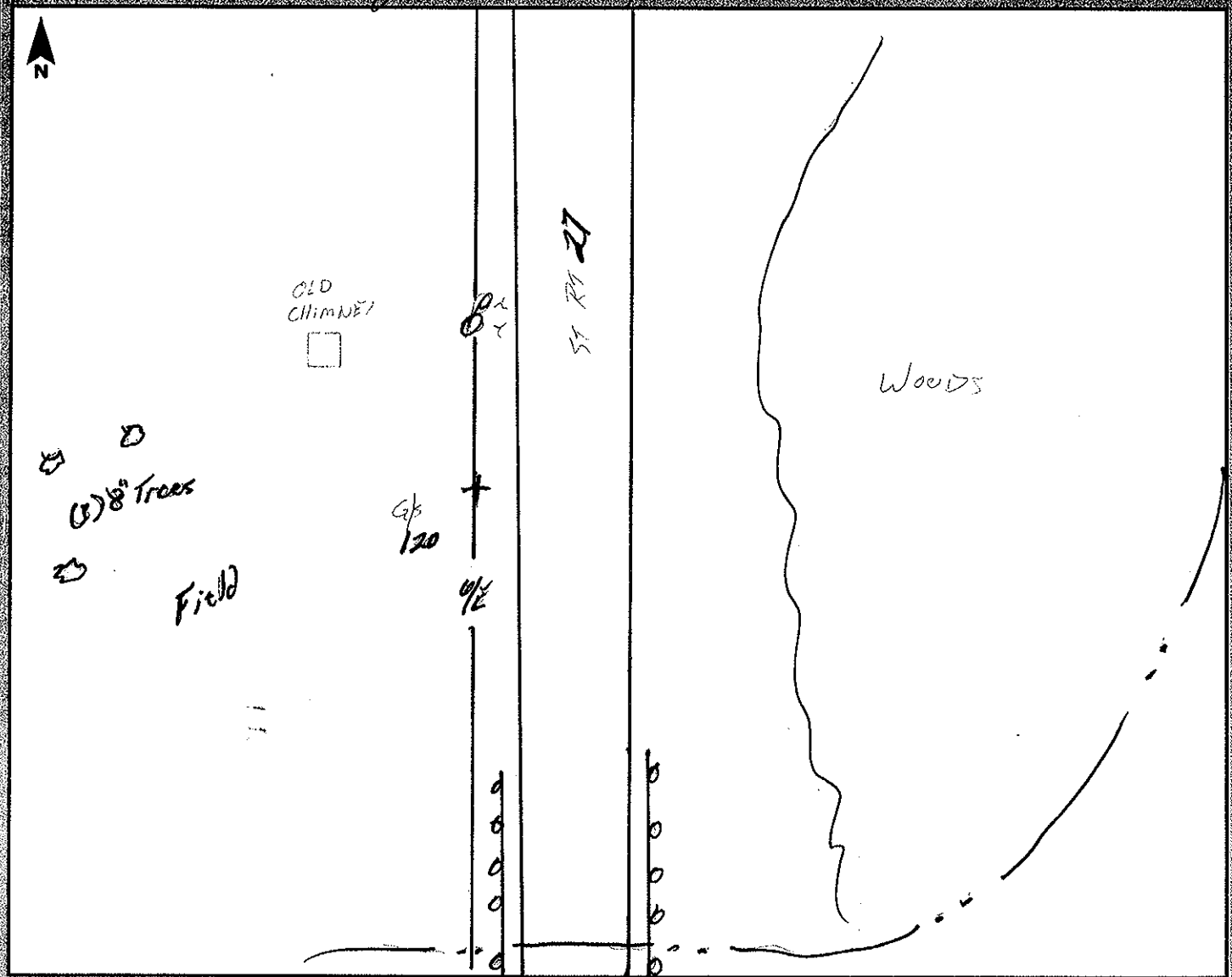
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: -

Weather Condition: Clovely

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 501

Operator Name: Blaken

Latitude: N 36-13-20

Julian Day: \_\_\_\_\_ Session No. 1

Longitude: W 84-41-59.4

Start Time: 3:30 End Time: 4:01

Ellip. Height: \_\_\_\_\_

Data File Name: 030811 Tndb

Type of Mark: 1/1m w/ Cap

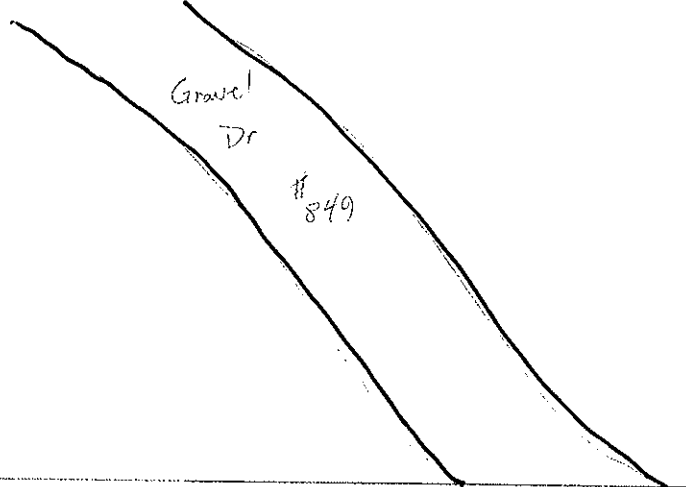
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

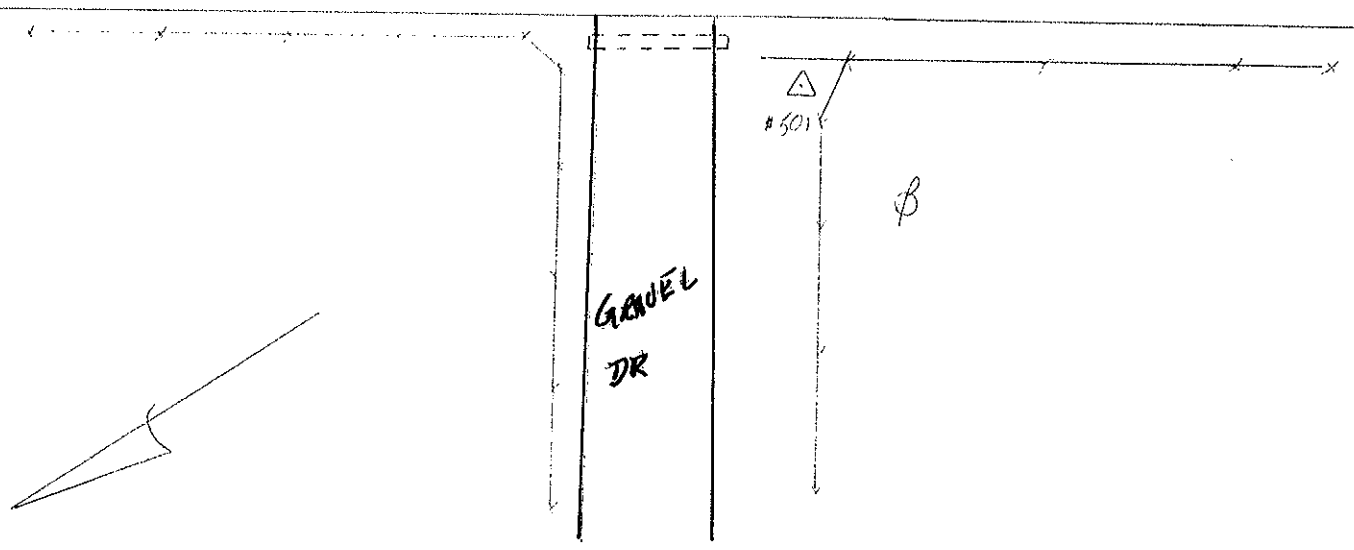
Type of Antenna: -

Weather Condition: Cloudy/Windy

Antenna Height: 2.000m to bottom of antenna mount



R4 329





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 502 (Recorded as 120)

Operator Name: Blaker

Latitude: N 36-09-44.2

Julian Day: 4.52 Session No. 1 5:23

Longitude: W 84-39-05.2

Start Time: 12:30 End Time: 1:00

Ellip. Height: \_\_\_\_\_

Data File Name: 0309115.ndb

Type of Mark: 1/2 Pin w/ Cap

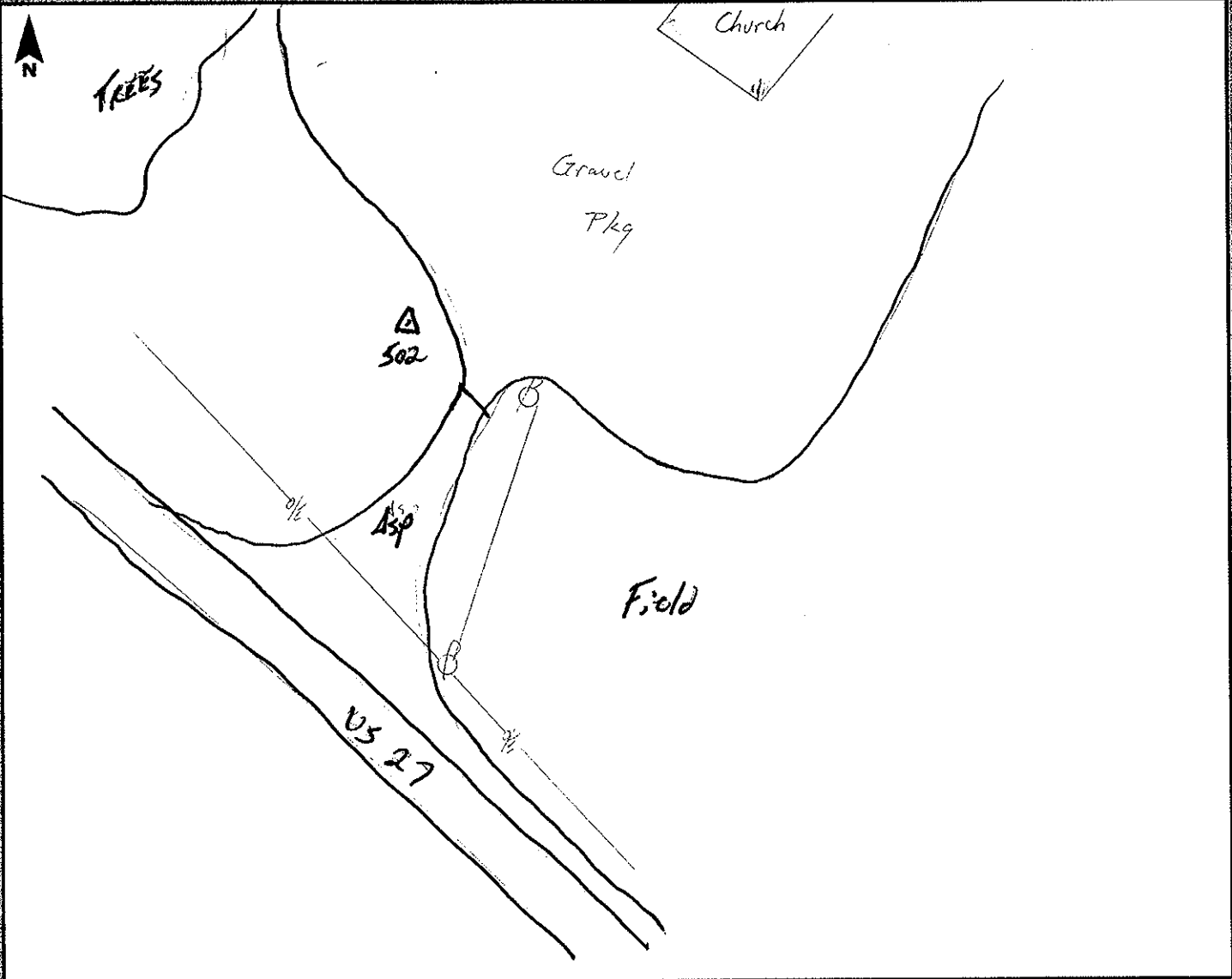
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 503

Operator Name: Blake

Latitude: N 36-07-30.9

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 84-25-21

Start Time: 1:32 End Time: 2:02

Ellip. Height: \_\_\_\_\_

Data File Name: 030911TND3

Type of Mark: RR SPIKE

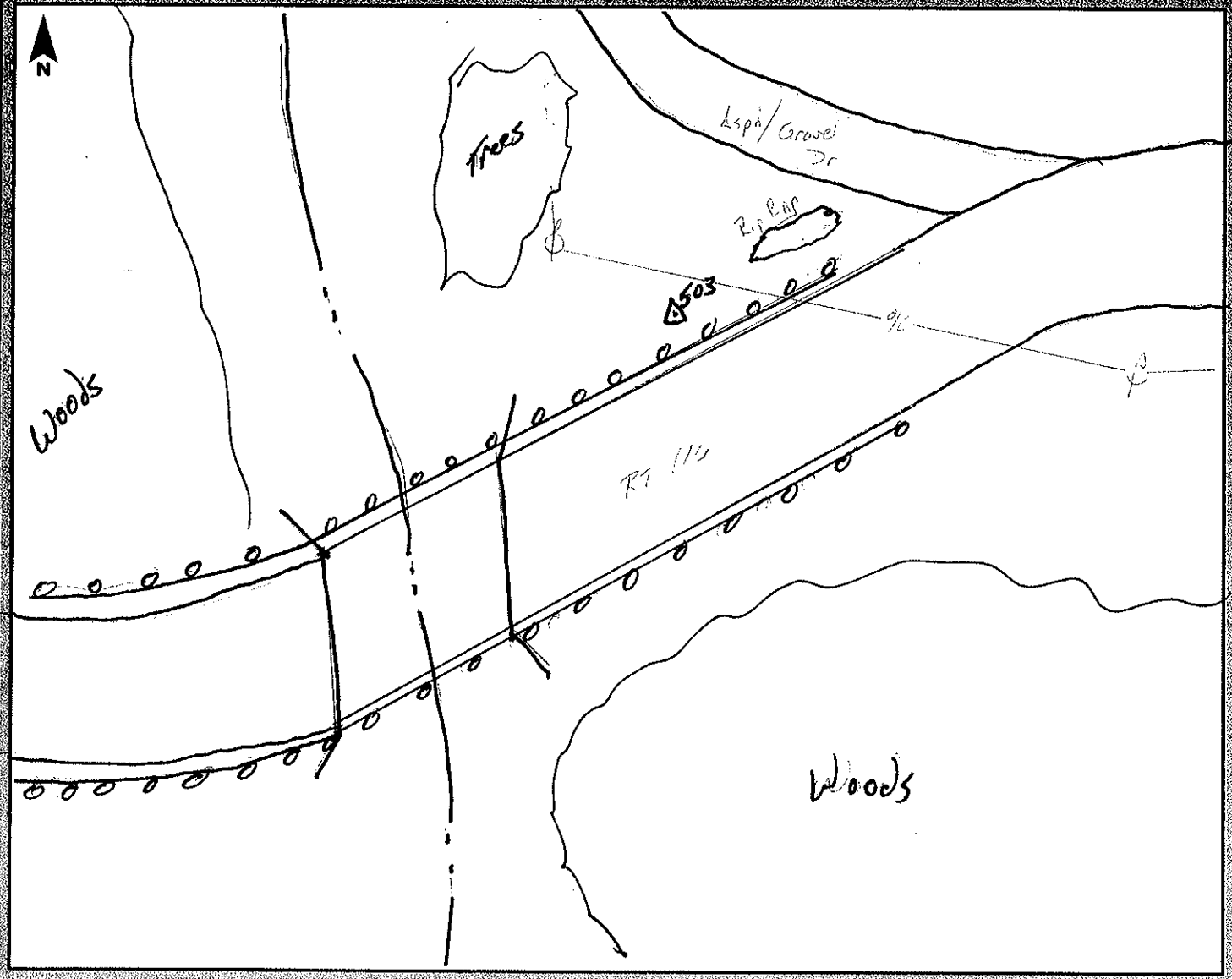
Type of Receiver: R8

Stamping on Mark: -

Type of Antenna: -

Weather Condition: Cloudy

Antenna Height: 2.000m to bottom of antenna mount





5



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 504

Operator Name: Bill Cutsball

Latitude: 36-08-23.1 N

Julian Day: 67 Session No. 1

Longitude: 84-21-18.5 W

Start Time: 16:49 End Time: 17:19

Ellip. Height: \_\_\_\_\_

Data File Name: 21120675.T01

Type of Mark: Set I-pin 2x8 panel

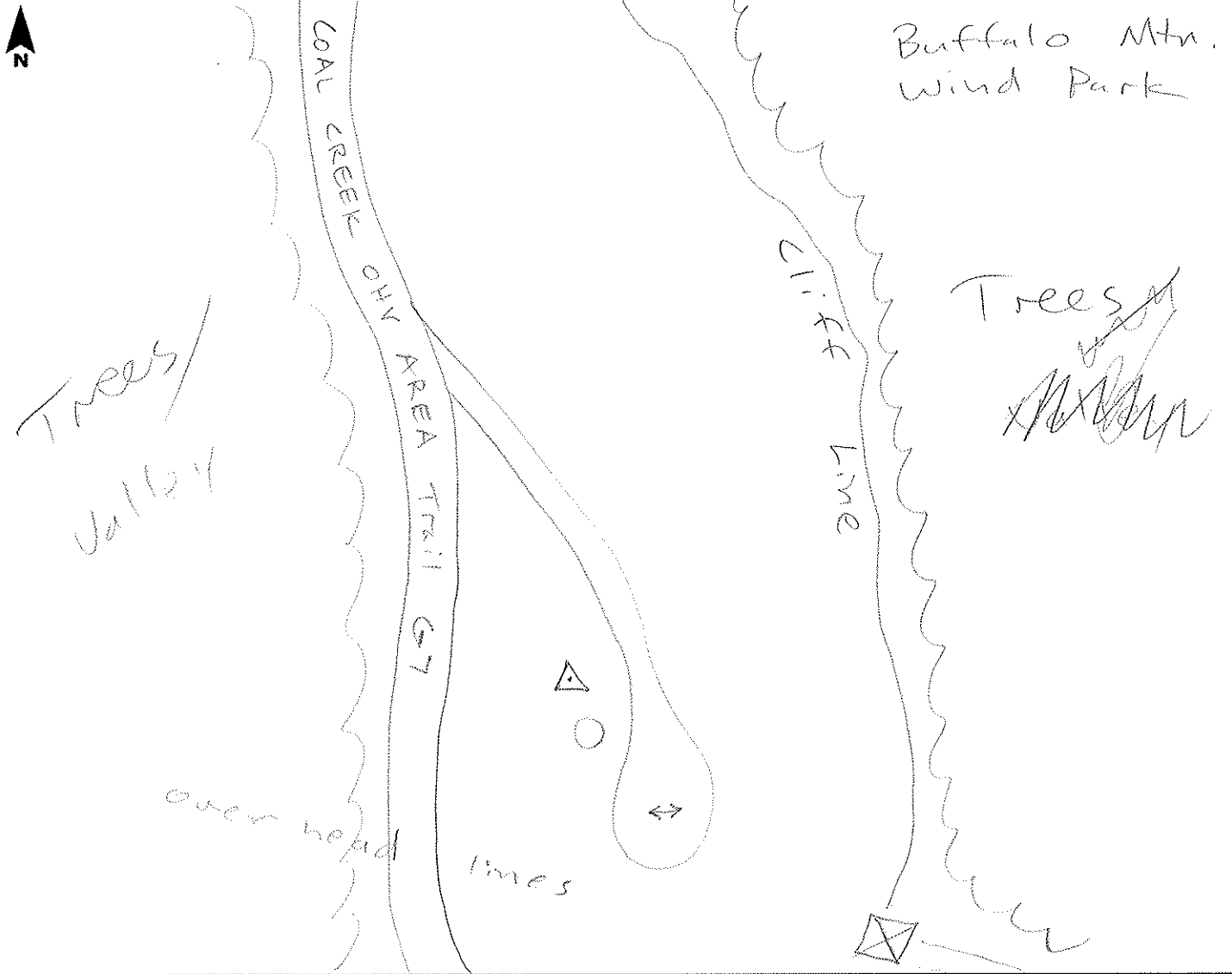
Type of Receiver: Trimble R8-Z 4714132112

Stamping on Mark: Woolpert Inc. Control sta.

Type of Antenna: N/A

Weather Condition: 50's raining

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 505

Operator Name: Blaker

Latitude: N 36-10-42.5

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 84-17-21.3

Start Time: 5:55 End Time: 6:25

Ellip. Height: 4/2 m of cap

Data File Name: 030911TND5

Type of Mark: 1/2 in w/ cap

Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

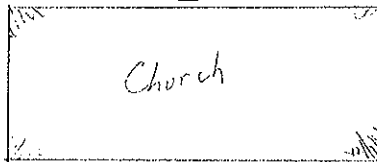
Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy / RAIN

Antenna Height: 2.000m to bottom of antenna mount



24"



Gravel PKg

TP  
116

Woods

\$

\*  
15" feet

Gravel PKg

5110  
in



# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: 506

Operator Name: Blaker

Latitude: N 36-19-42.4

Julian Day: 6 Session No. 4

Longitude: W 84-22-01.8

Start Time: 4:14 End Time: 4:44

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND5

Type of Mark: 11pin w/ cap  
RTD Car Wash Brothock Church

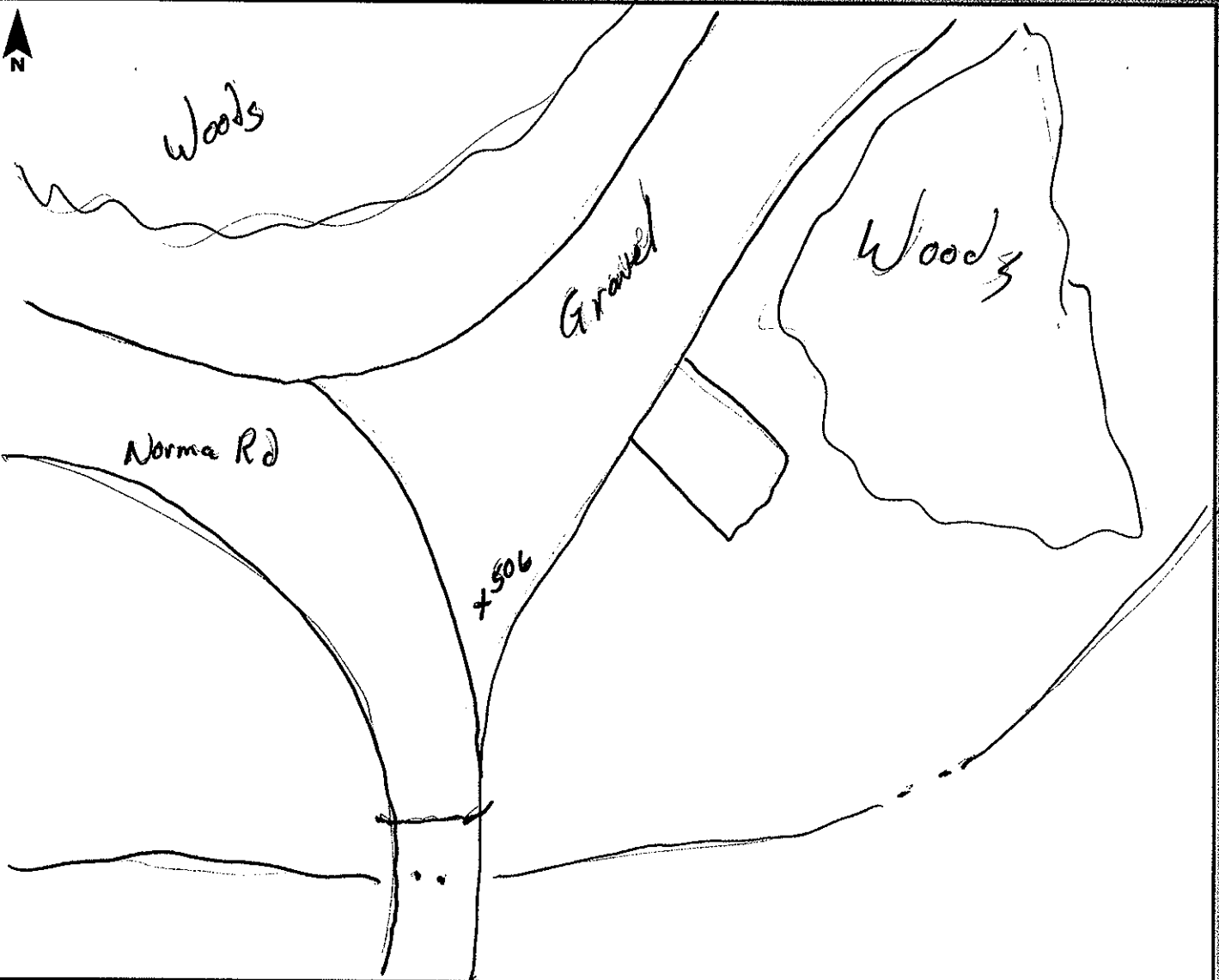
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Sunny

Antenna Height: 2.000m to bottom of antenna mount



E + W



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 507

Operator Name: Bill Cutshall

Latitude: 36-18-56.7 N

Julian Day: 68 Session No. 2

Longitude: 84-30-47.8 W

Start Time: 10:59 End Time: 11:30

Ellip. Height: \_\_\_\_\_

Data File Name: 21120681.T01

Type of Mark: Set I. pin 2x8 panel

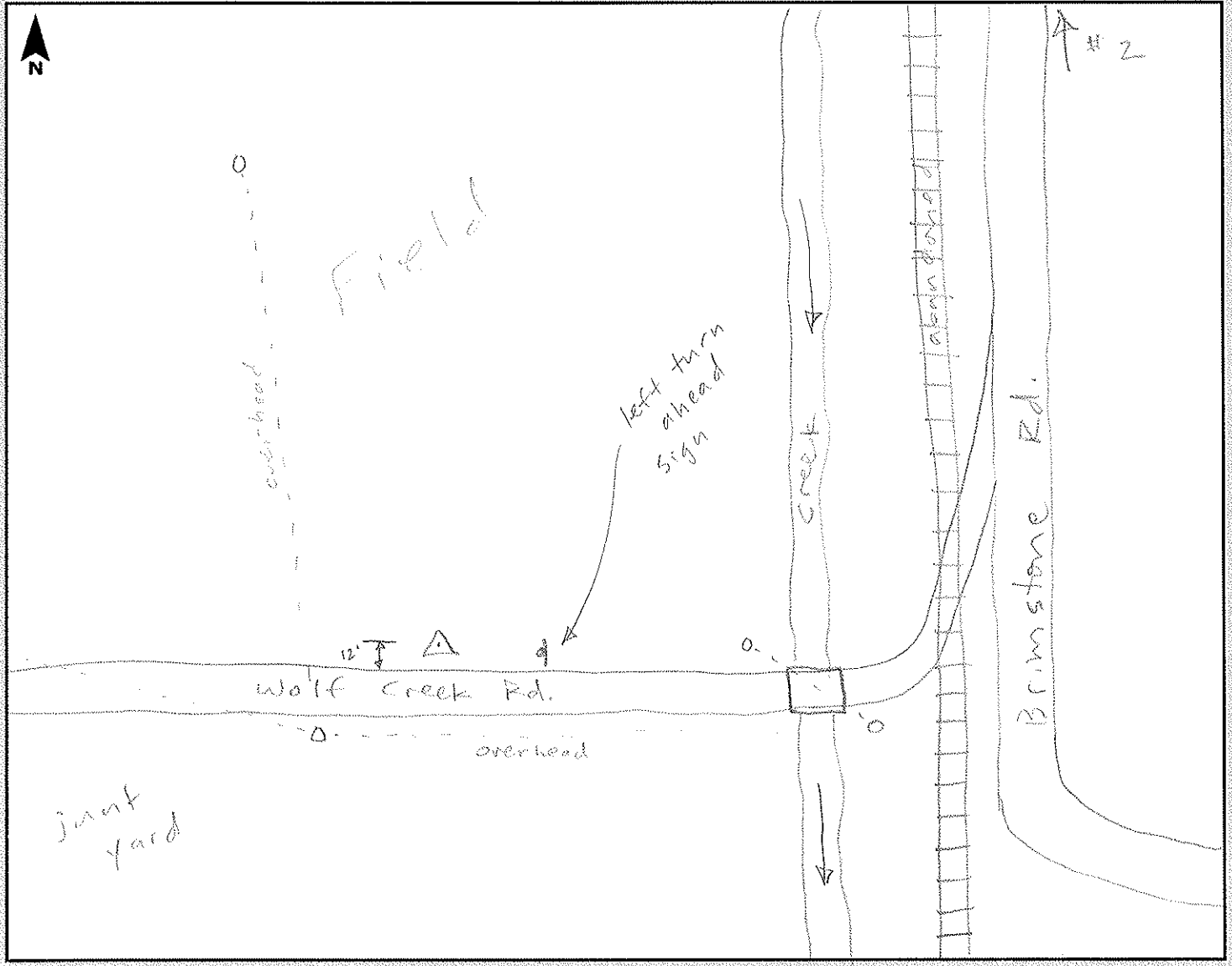
Type of Receiver: Trimble RB-2 4718132112

Stamping on Mark: Woolpert Inc. control sta.

Type of Antenna: N/A

Weather Condition: 50's raining

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 7/272 Survey Date: 3/11/11

Station Name: 508

Operator Name: Blaker

Latitude: N 36-26-20.7

Julian Day: \_\_\_\_\_ Session No. \_\_\_\_\_

Longitude: W 84-18-38.8

Start Time: 9:23 End Time: 9:57

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND6

Type of Mark: PID BB Court Church

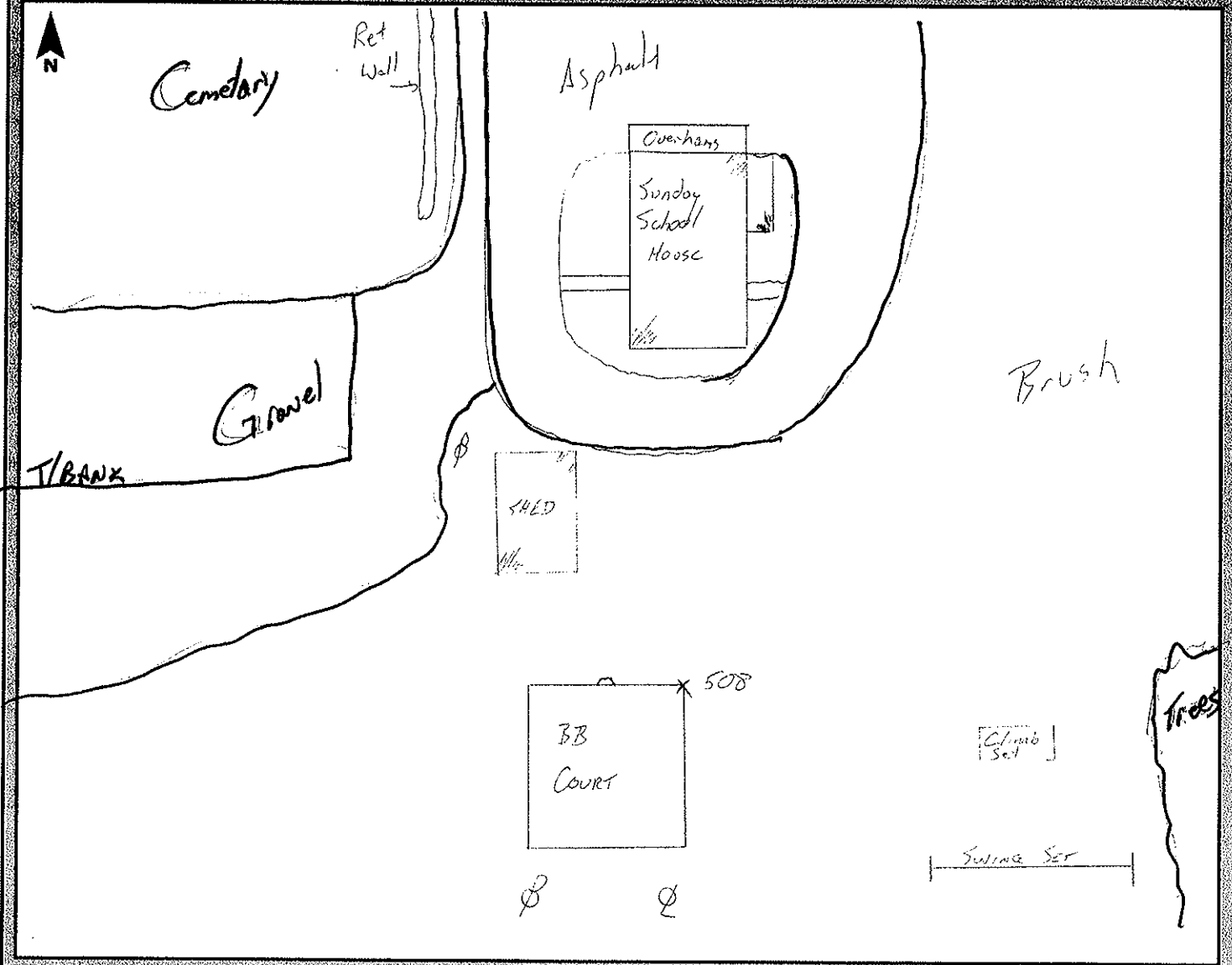
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 509

Operator Name: Blaker

Latitude: N 36-28-58.7

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-04-49.8

Start Time: 10:49 End Time: 11:19

Ellip. Height: \_\_\_\_\_

Data File Name: 031011TND6

Type of Mark: 1/PIN w/ CAP

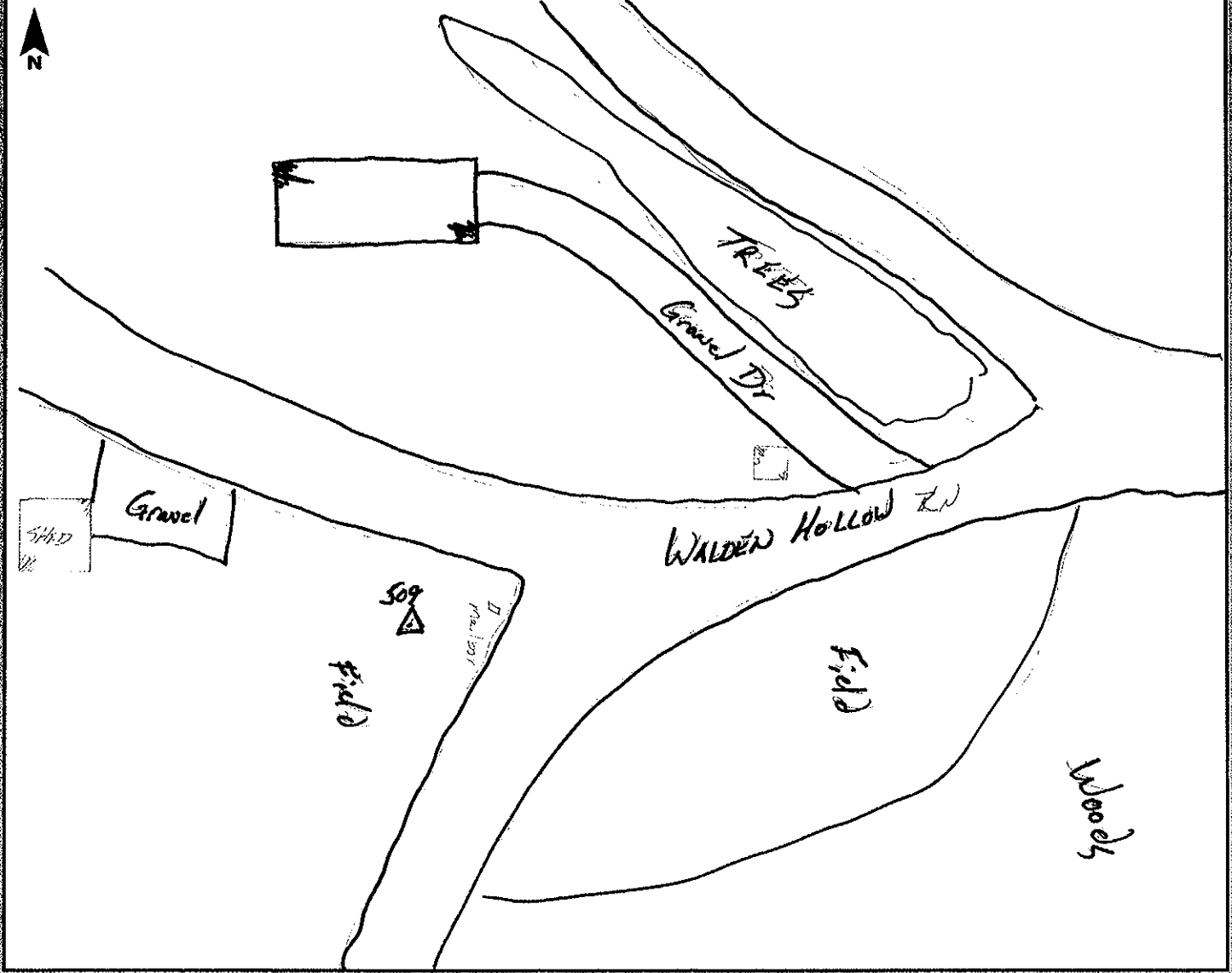
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy / Cold

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 510

Operator Name: Blaker

Latitude: N 36-23-07.9

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-07-20.6

Start Time: 4:11 End Time: 4:41

Ellip. Height: \_\_\_\_\_

Data File Name: 031011 ENDS

Type of Mark: PID SW Cor Drive

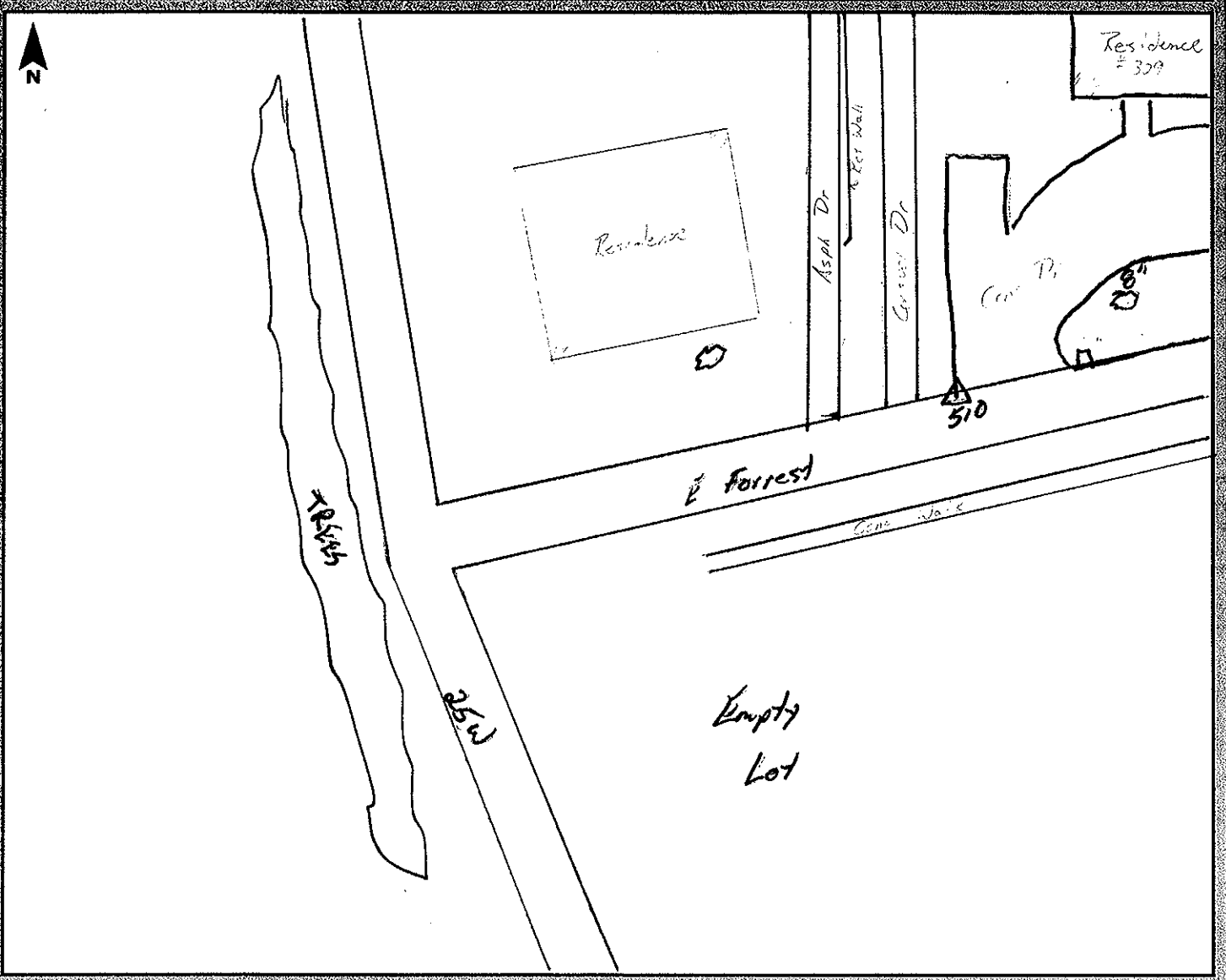
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy/Rain

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tean Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 511

Operator Name: Blaker

Latitude: N 36-19-33

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-13-04.9

Start Time: 5:46 End Time: 6:16

Ellip. Height: \_\_\_\_\_

Data File Name: 031011TND6

Type of Mark: PID

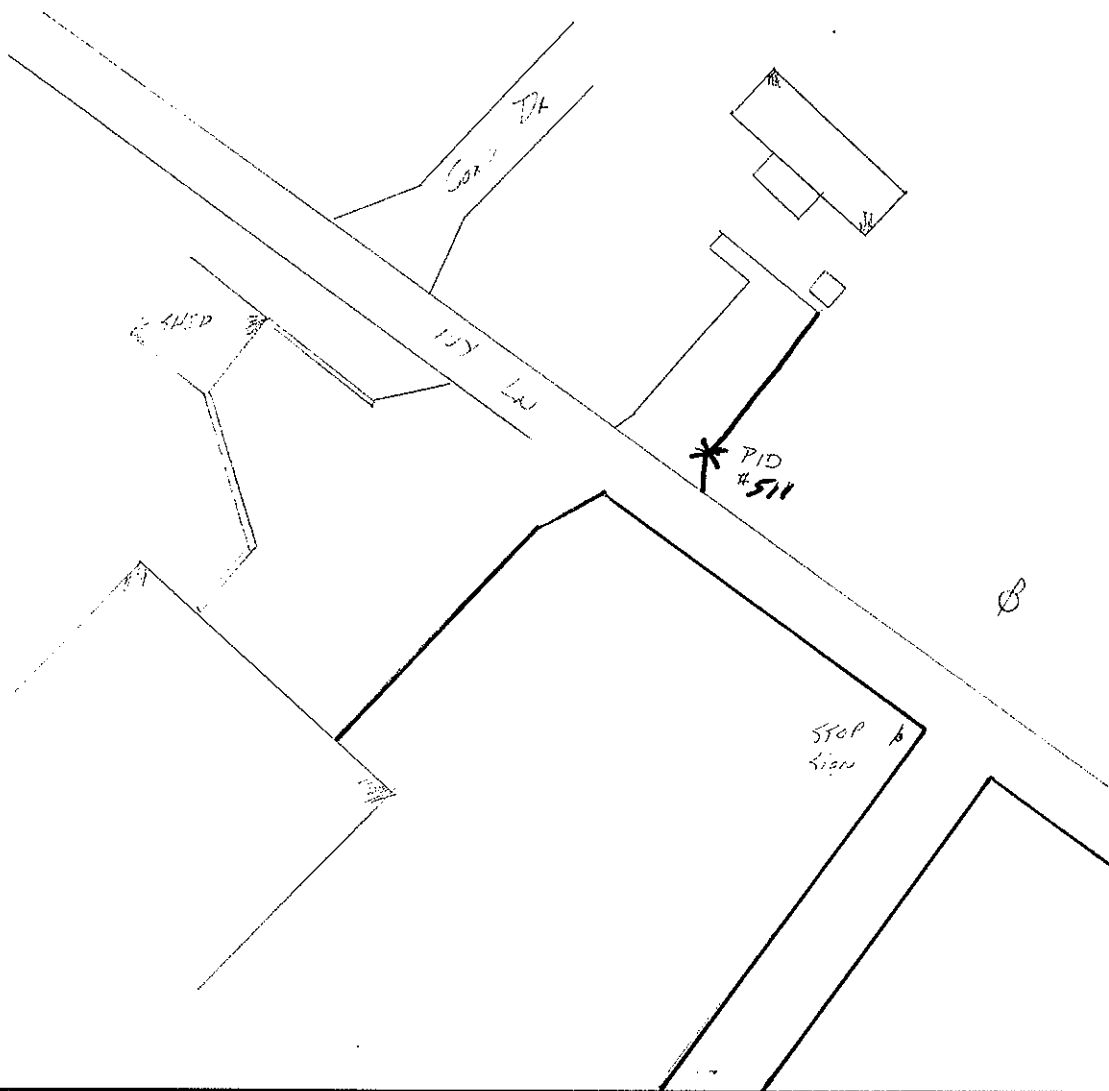
Type of Receiver: AS

Stamping on Mark: -

Type of Antenna: \_\_\_\_\_

Weather Condition: RAIN/sleet

Antenna Height: 2.000m to bottom of antenna mount







# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 512

Operator Name: Blaker

Latitude: N 36-26-20.9

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-04-46.9

Start Time: 1:17 End Time: 1:47

Ellip. Height: \_\_\_\_\_

Data File Name: 031011TND3

Type of Mark: 1/8" w/ Cap

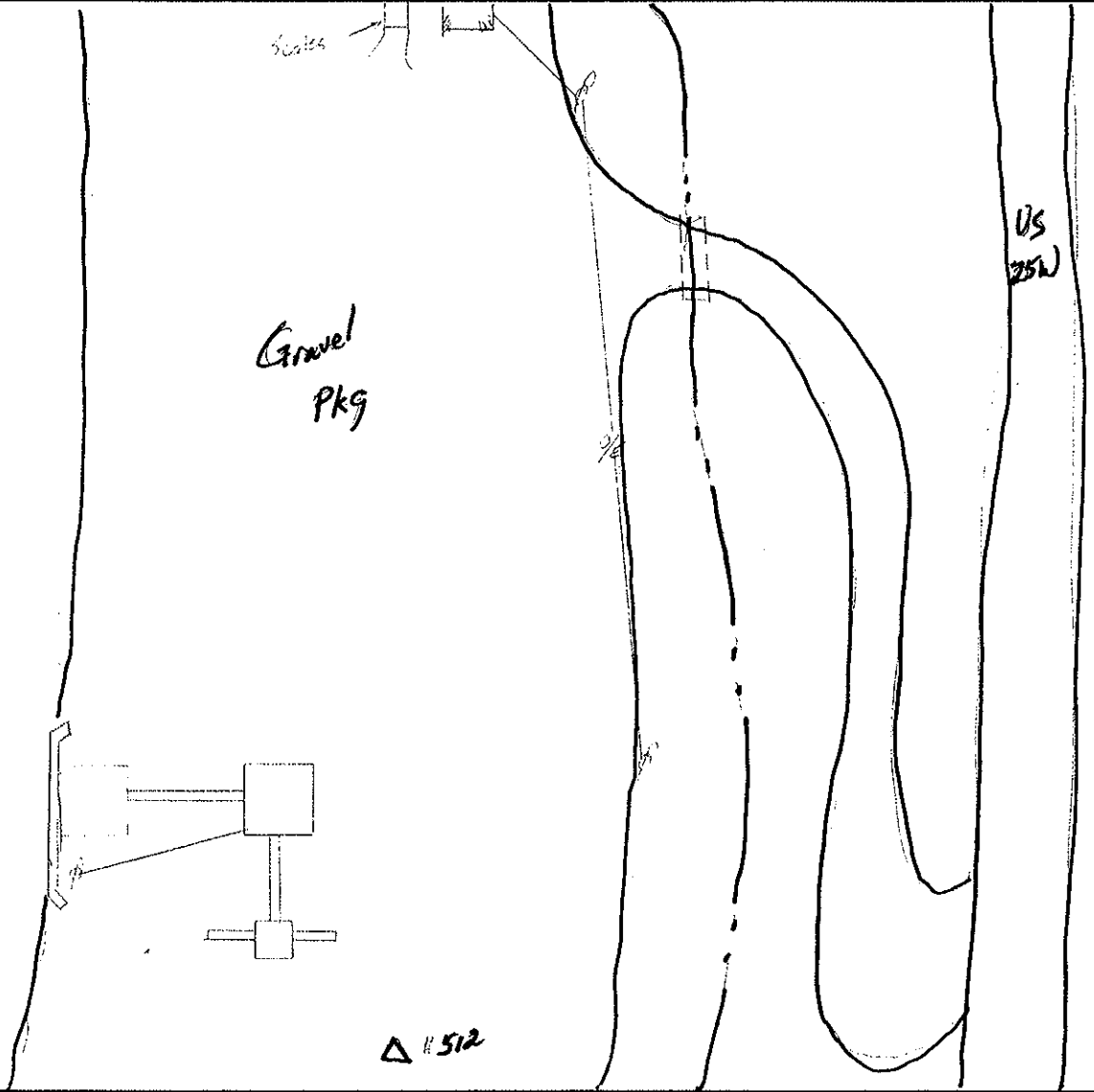
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Rain

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 513

Operator Name: Blakey

Latitude: N 36-09-57.9

Julian Day: \_\_\_\_\_ Session No. 1

Longitude: W 84-23-12.2

Start Time: 10:25 End Time: 7pm

Ellip. Height: \_\_\_\_\_

Data File Name: 030811TND6

Type of Mark: 1/4" pin w/ cap

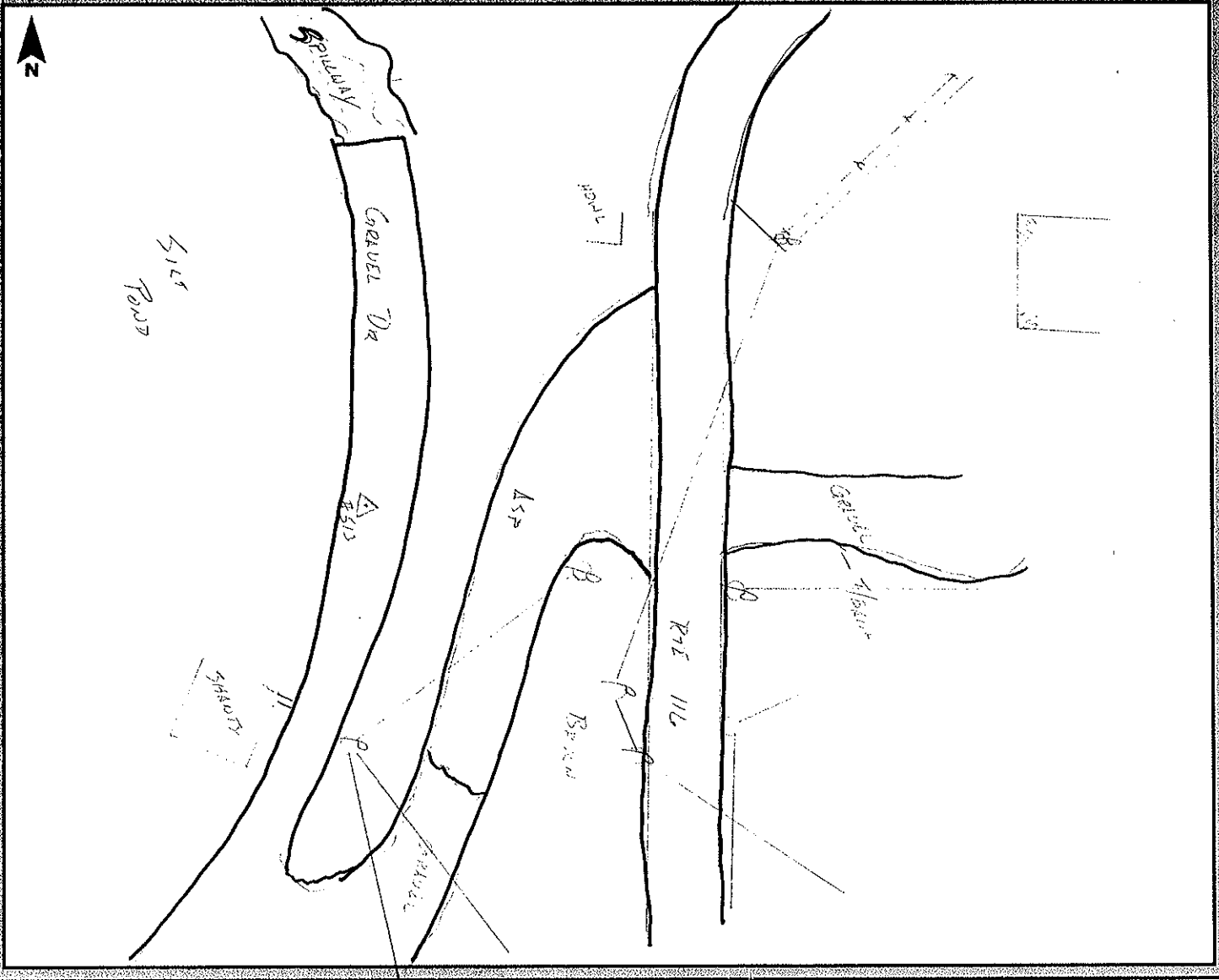
Type of Receiver: Trimble 5800

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Ptly Sunny

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: 514

Operator Name: Bloker

Latitude: N 36-22-43.8

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-14-51.7

Start Time: 10:21 End Time: 10:51

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND6

Type of Mark: PID

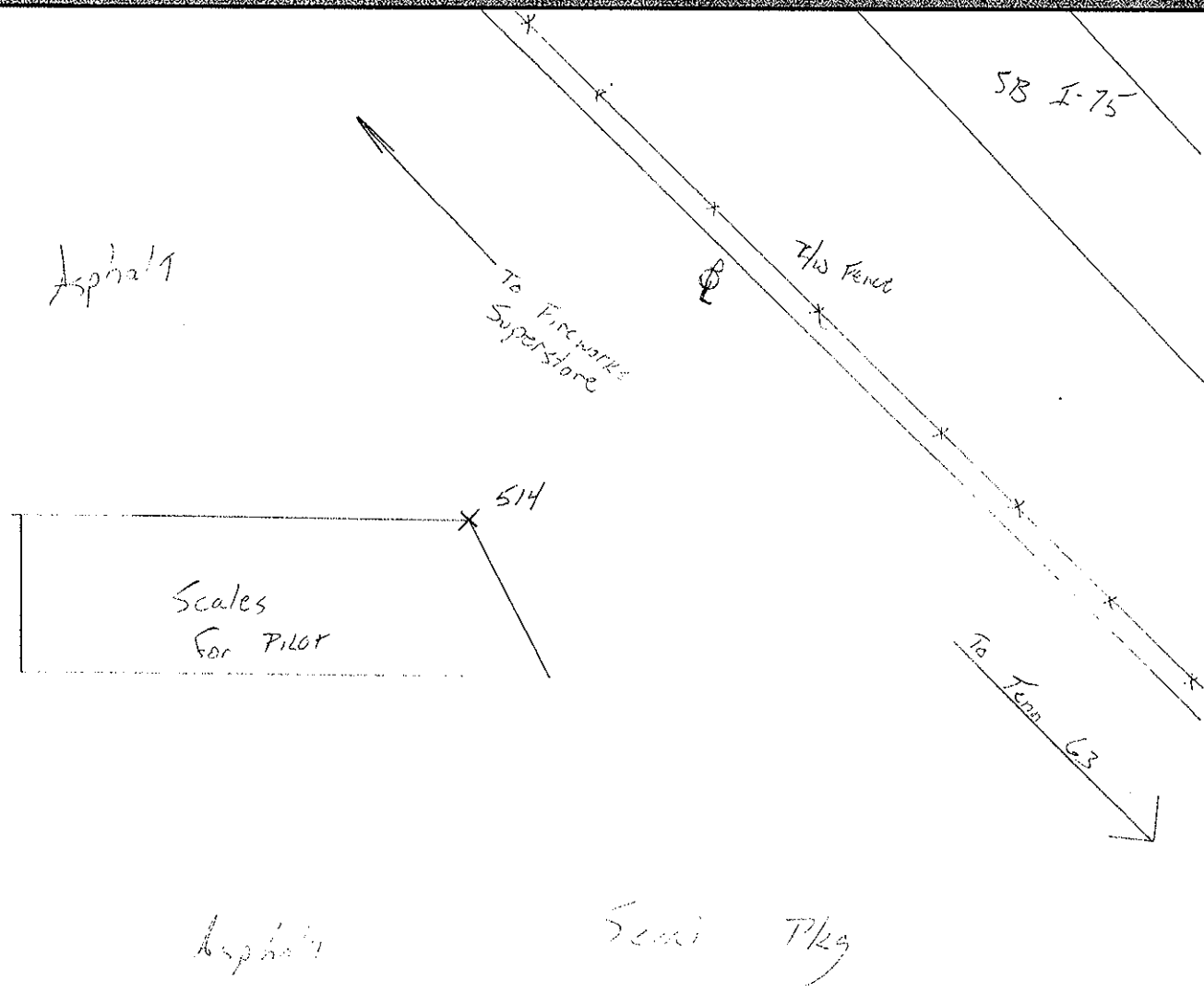
Type of Receiver: R8

Stamping on Mark: -

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy / Windy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: 515

Operator Name: Blaker

Latitude: N 36-24-53.4

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-18-03.8

Start Time: 11:27 End Time: 11:57

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TWdb

Type of Mark: PID Mon

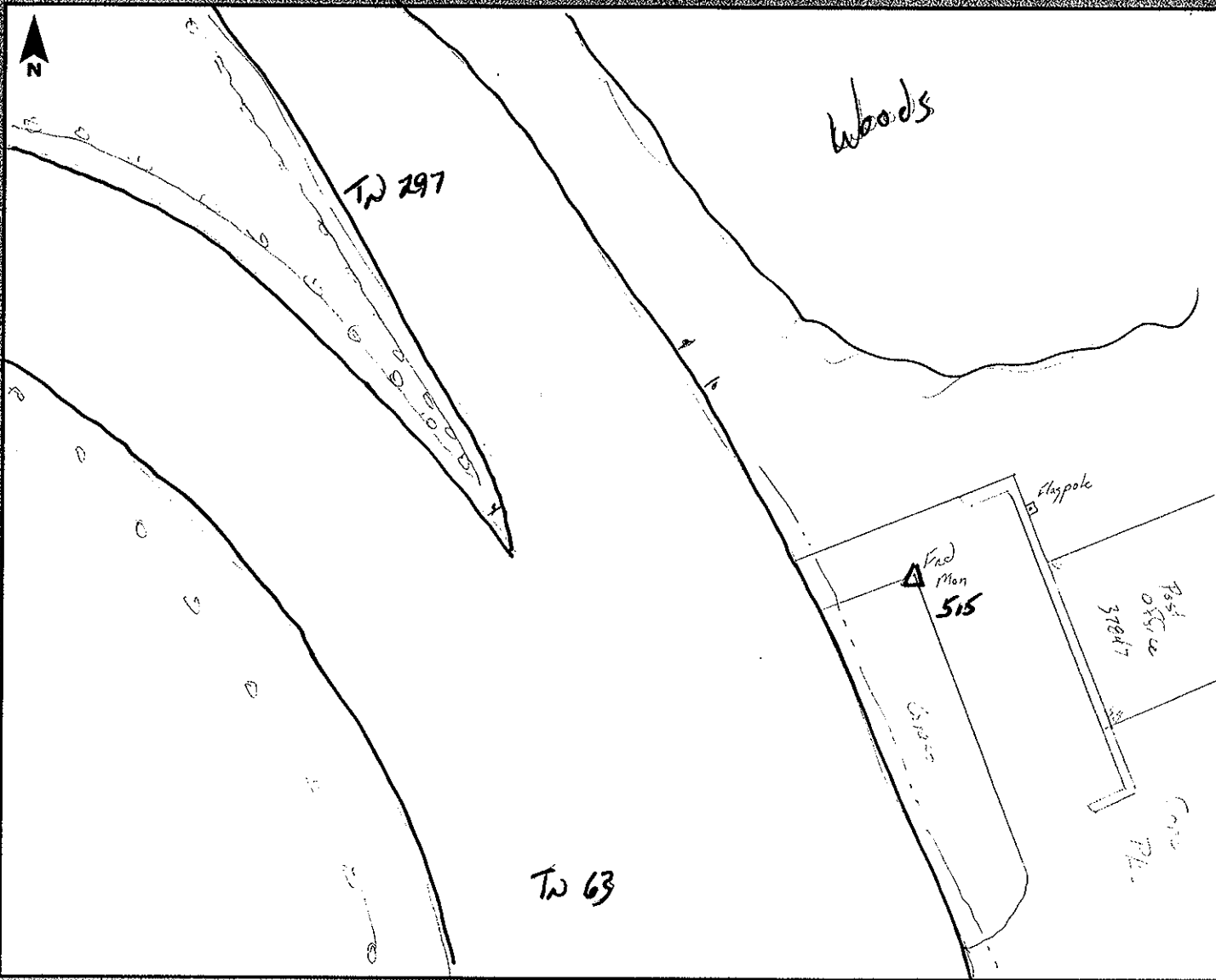
Type of Receiver: R8

Stamping on Mark: 144

Type of Antenna: \_\_\_\_\_

Weather Condition: Ptly Sunny

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71228 Survey Date: 3/4/11

Station Name: 516

Operator Name: Blaker

Latitude: N 36-23-35.7

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-19-43.7

Start Time: 1:59 End Time: 2:29

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND3

Type of Mark: PID Drive near City Sign

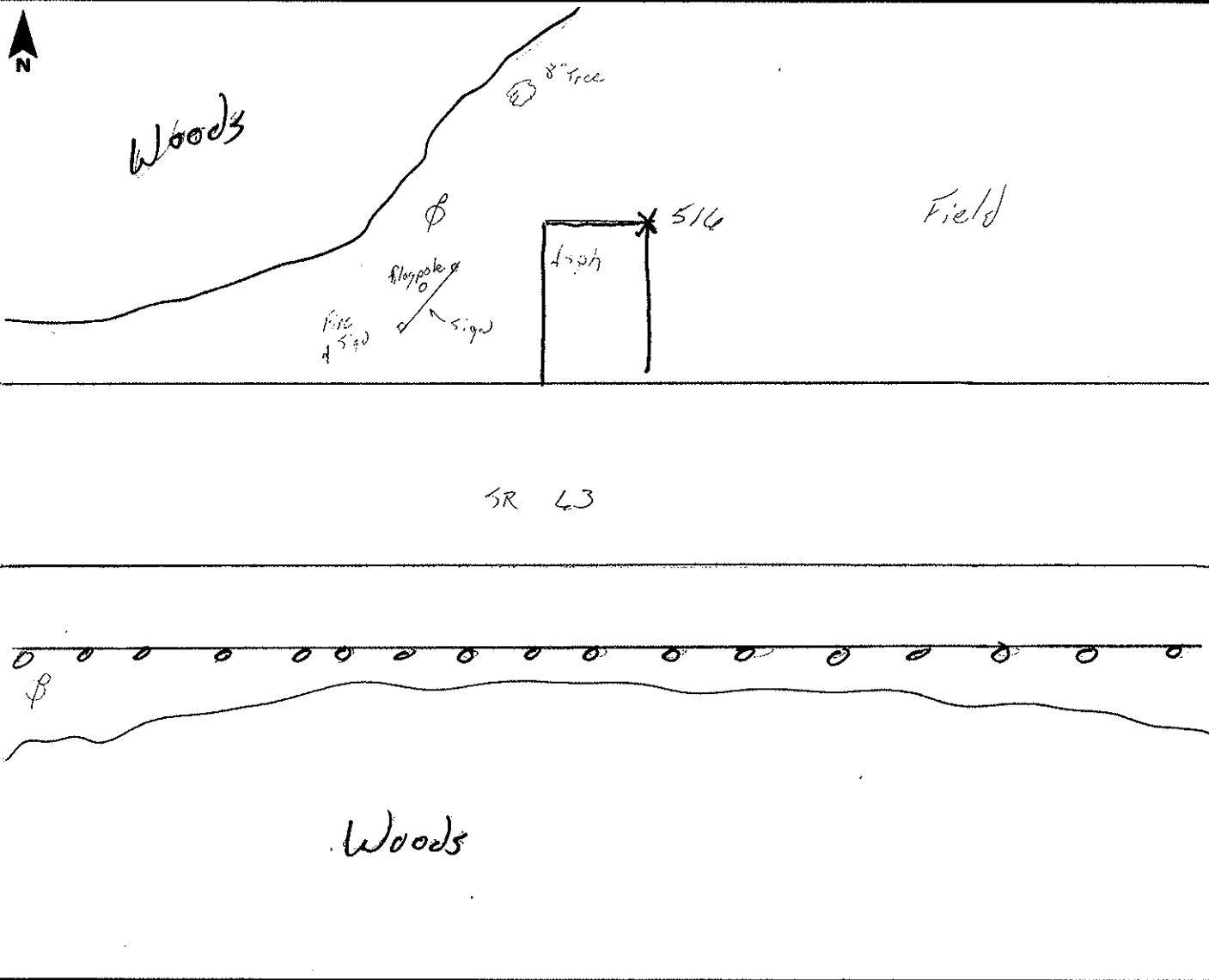
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Partly Sunny

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 517

Operator Name: Baker

Latitude: N 36-26-48.4

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-04-04.6

Start Time: 1:53 End Time: 2:23

Ellip. Height: \_\_\_\_\_

Data File Name: 031011TND6

Type of Mark: SW Cor SW PID

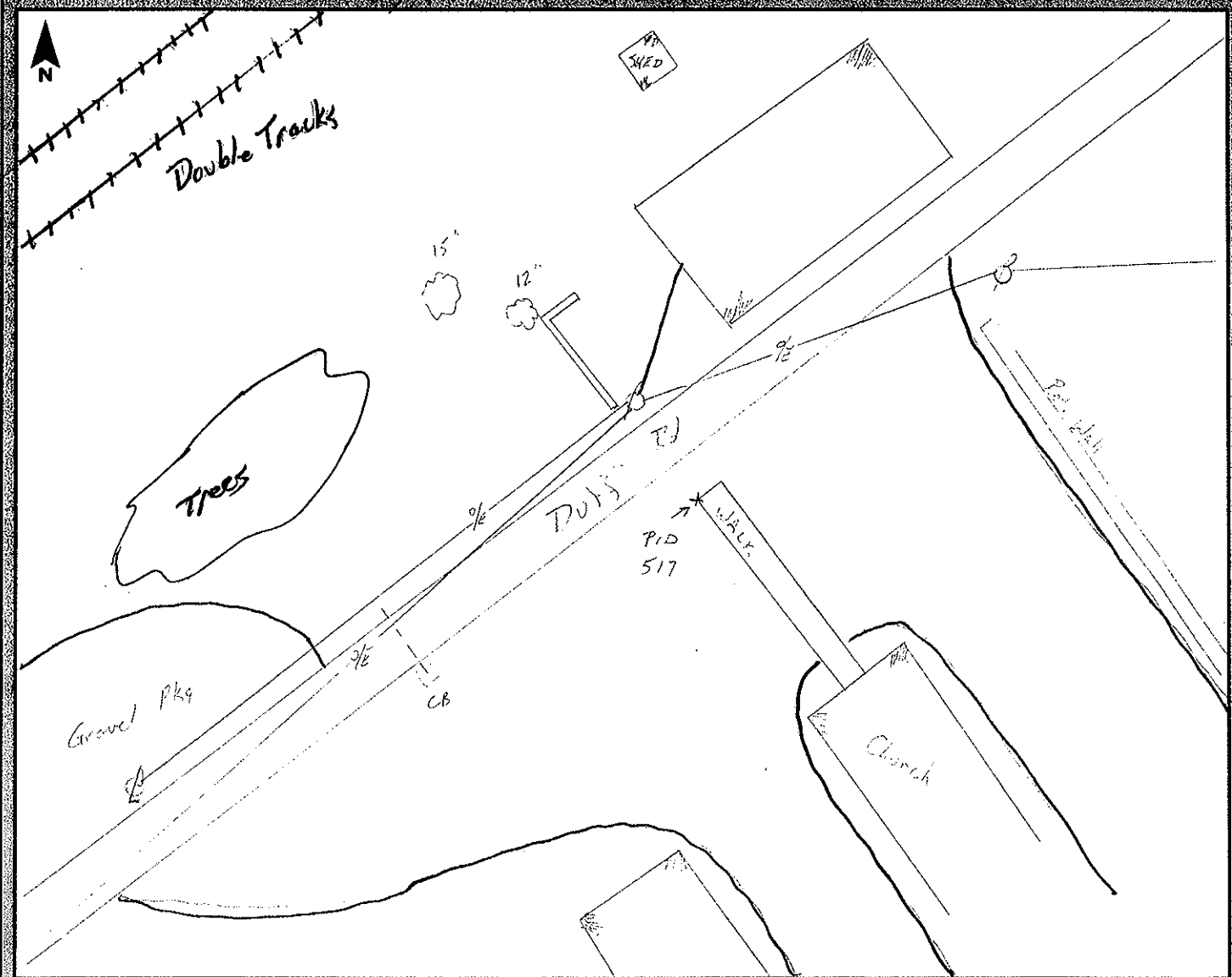
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy / RAIN

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tean Mines

Project Number: 71278

Survey Date: 3/19/11

Station Name: 518

Operator Name: Blaker

Latitude: N 36-12-40.5

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 21-19-12.2

Start Time: 4:43 End Time: 5:13

Ellip. Height: \_\_\_\_\_

Data File Name: 030911TND6

Type of Mark: 1/2 w/ cap

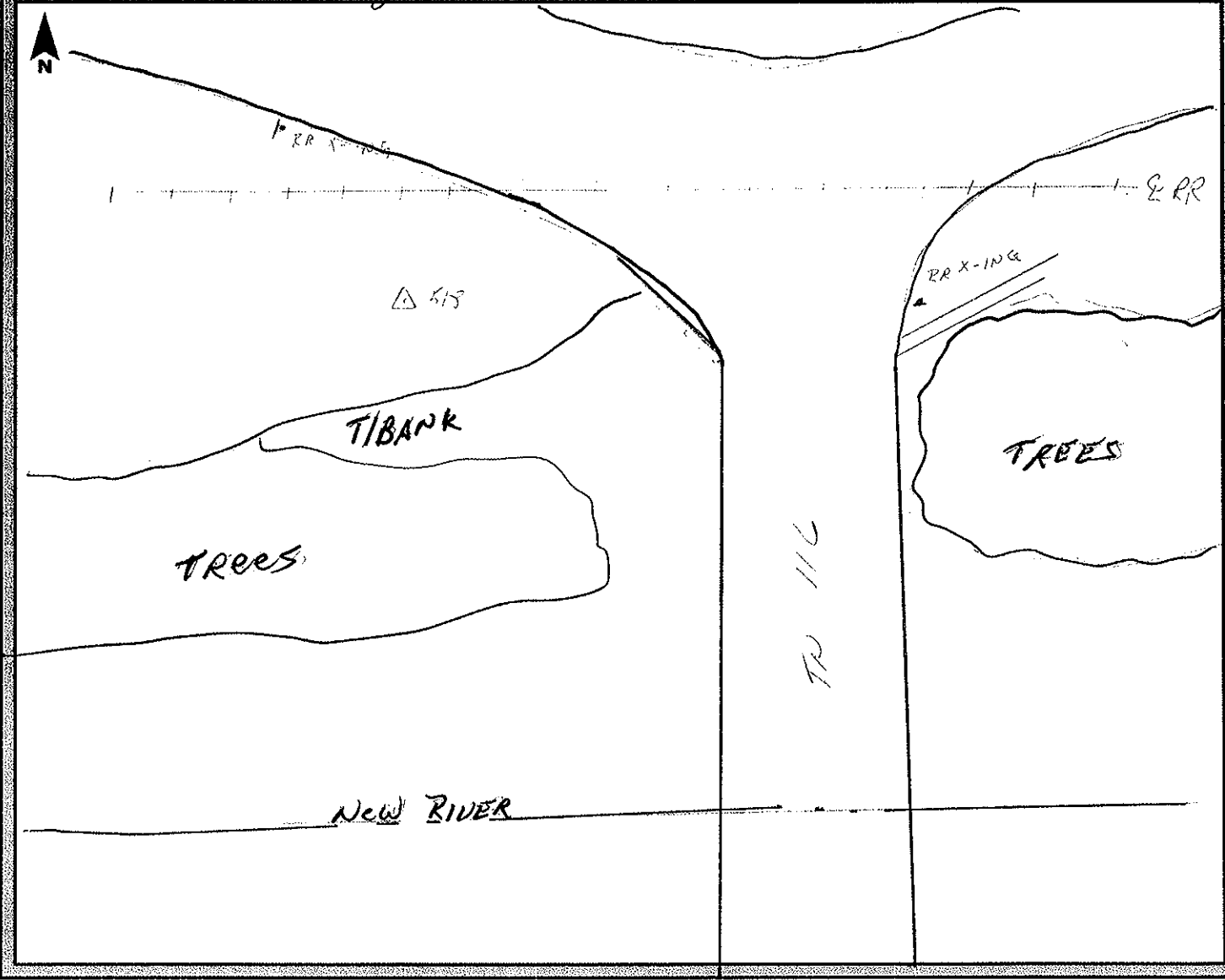
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy / RAIN

Antenna Height: 2.000m to bottom of antenna mount



SE, NW



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 519

Operator Name: Bill Cutshall

Latitude: 36-09-24.3 N

Julian Day: 67 Session No. 1

Longitude: 84-26-01.1 W

Start Time: 10:45 End Time: 11:15

Ellip. Height: \_\_\_\_\_

Data File Name: 21120670.T01

Type of Mark: Set I. pin 2XB panel

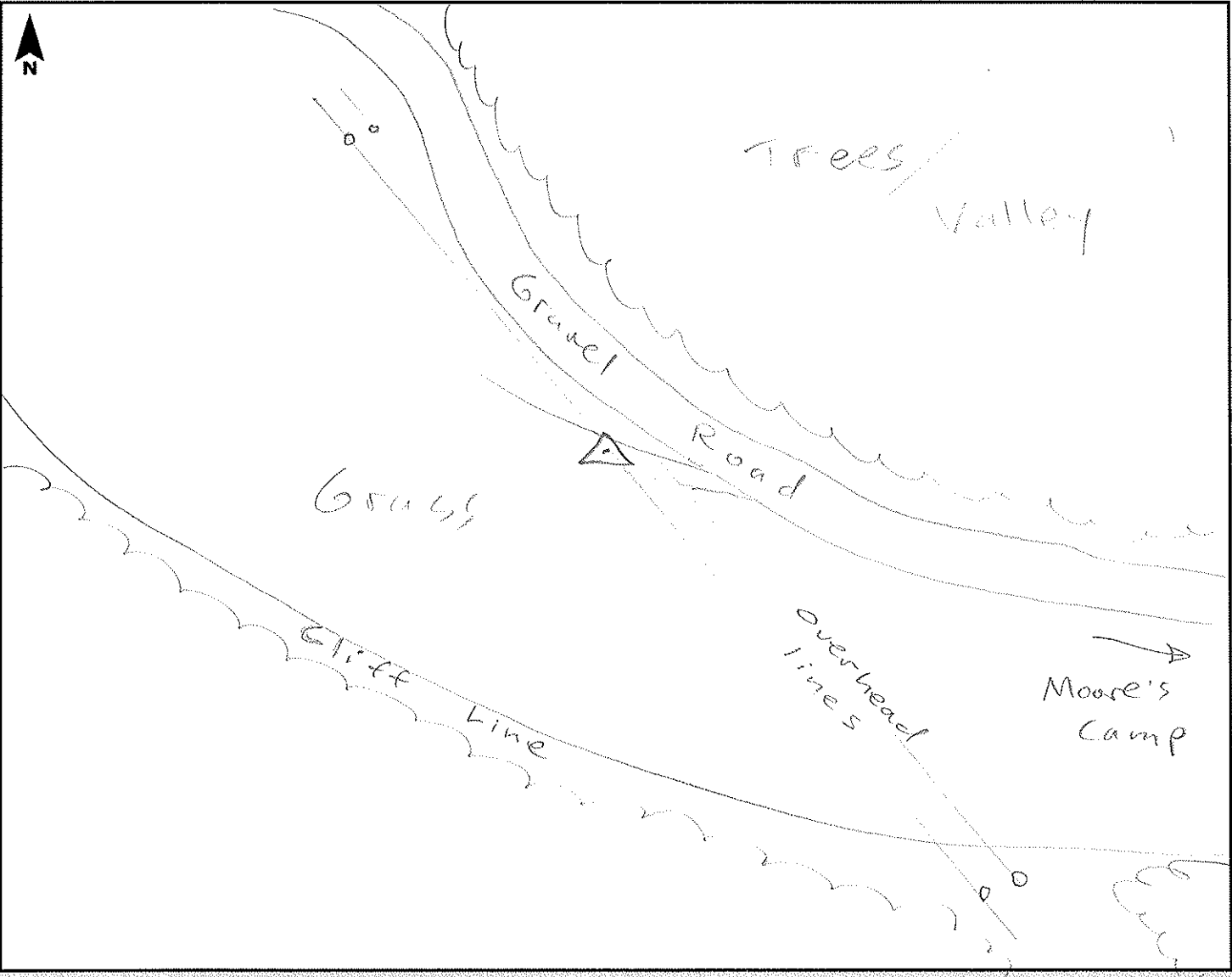
Type of Receiver: Trimble RB-2  
4718132112

Stamping on Mark: Woolpert Inc. Control  
Sta.

Type of Antenna: N/A

Weather Condition: 50's Cloudy

Antenna Height: 2.000m to bottom of antenna mount







# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 520

Operator Name: Blaker

Latitude: N 36-29-57.2

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-04-15.2

Start Time: 10:10 End Time: 10:40

Ellip. Height: \_\_\_\_\_

Data File Name: 031011TND6

Type of Mark: 1/2 pin w/ cap

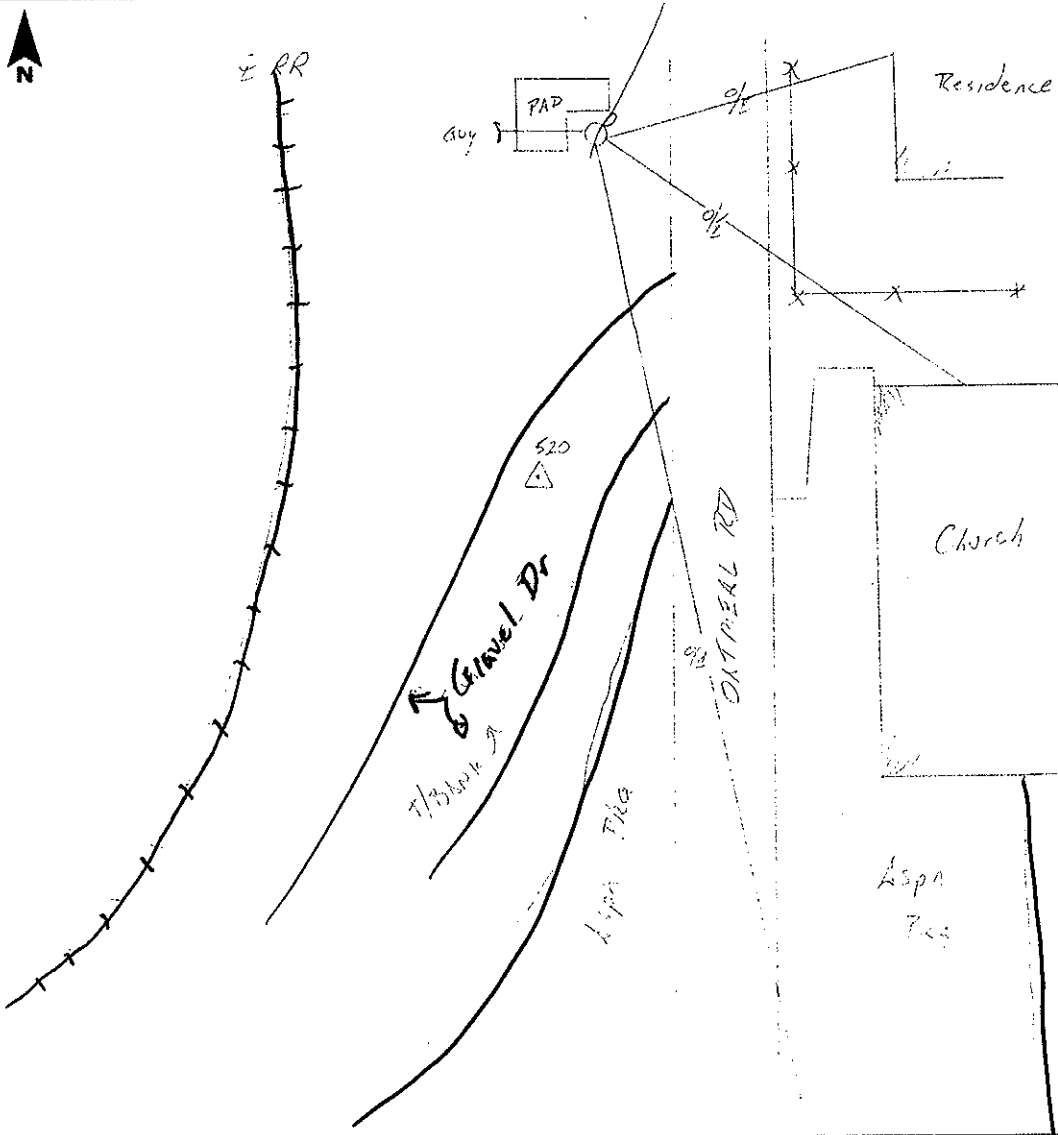
Type of Receiver: RB

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy / Cold

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 1001

Operator Name: Blakley

Latitude: N 36-11-57.5

Julian Day: 158 Session No. 1

Longitude: W 84-39-40.2

Start Time: 1:47 End Time: 2:28

Ellip. Height: \_\_\_\_\_

Data File Name: 030811TND6

Type of Mark: G/S

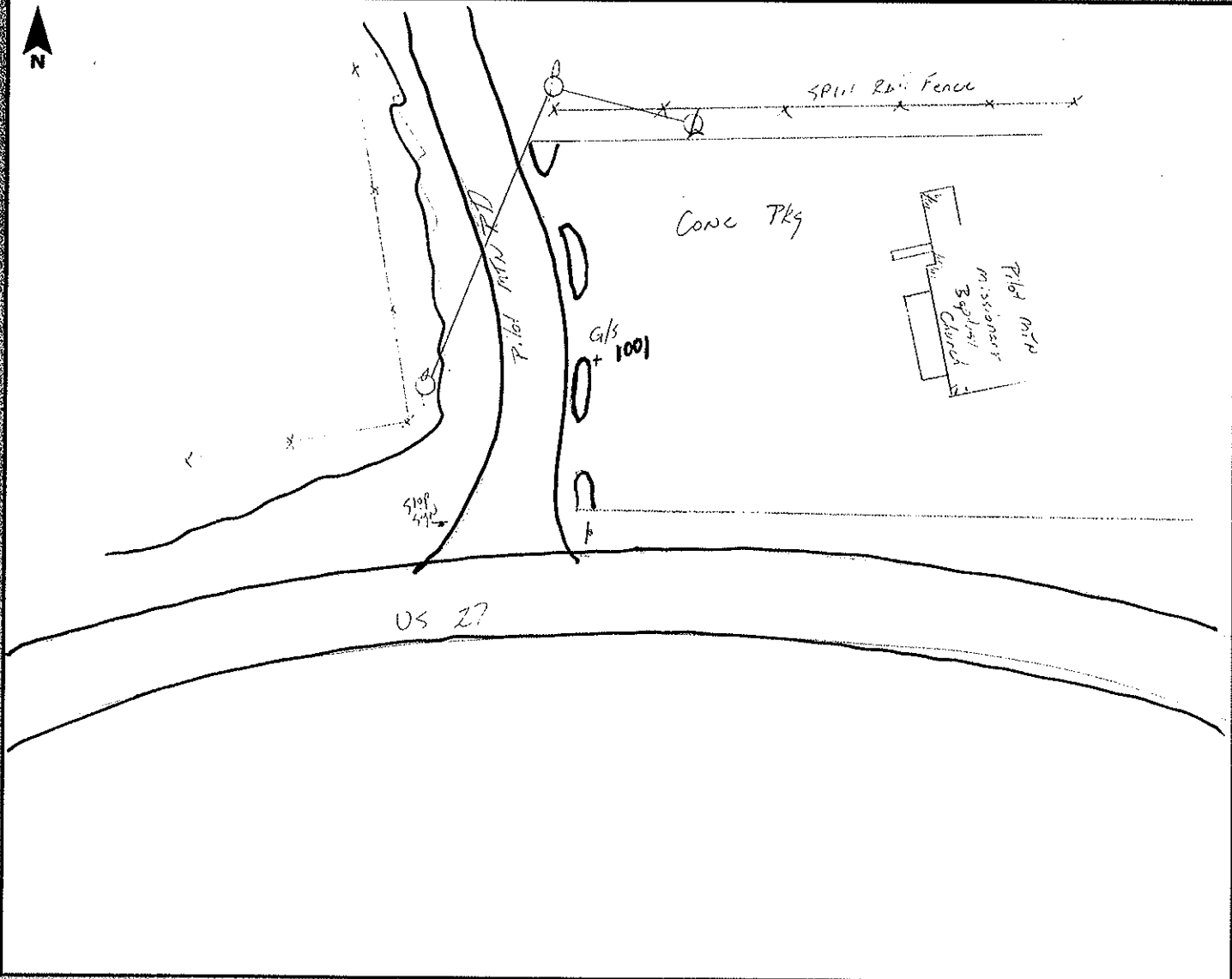
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy/Windy

Antenna Height: 2.000m to bottom of antenna mount



E + W



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 1002

Operator Name: Bill Cutshall

Latitude: 36-18-56.8 N

Julian Day: 68 Session No. 2

Longitude: 84-30-51.6 W

Start Time: 11:39 End Time: 12:09

Ellip. Height: \_\_\_\_\_

Data File Name: 21120682.T01

Type of Mark: ground shot

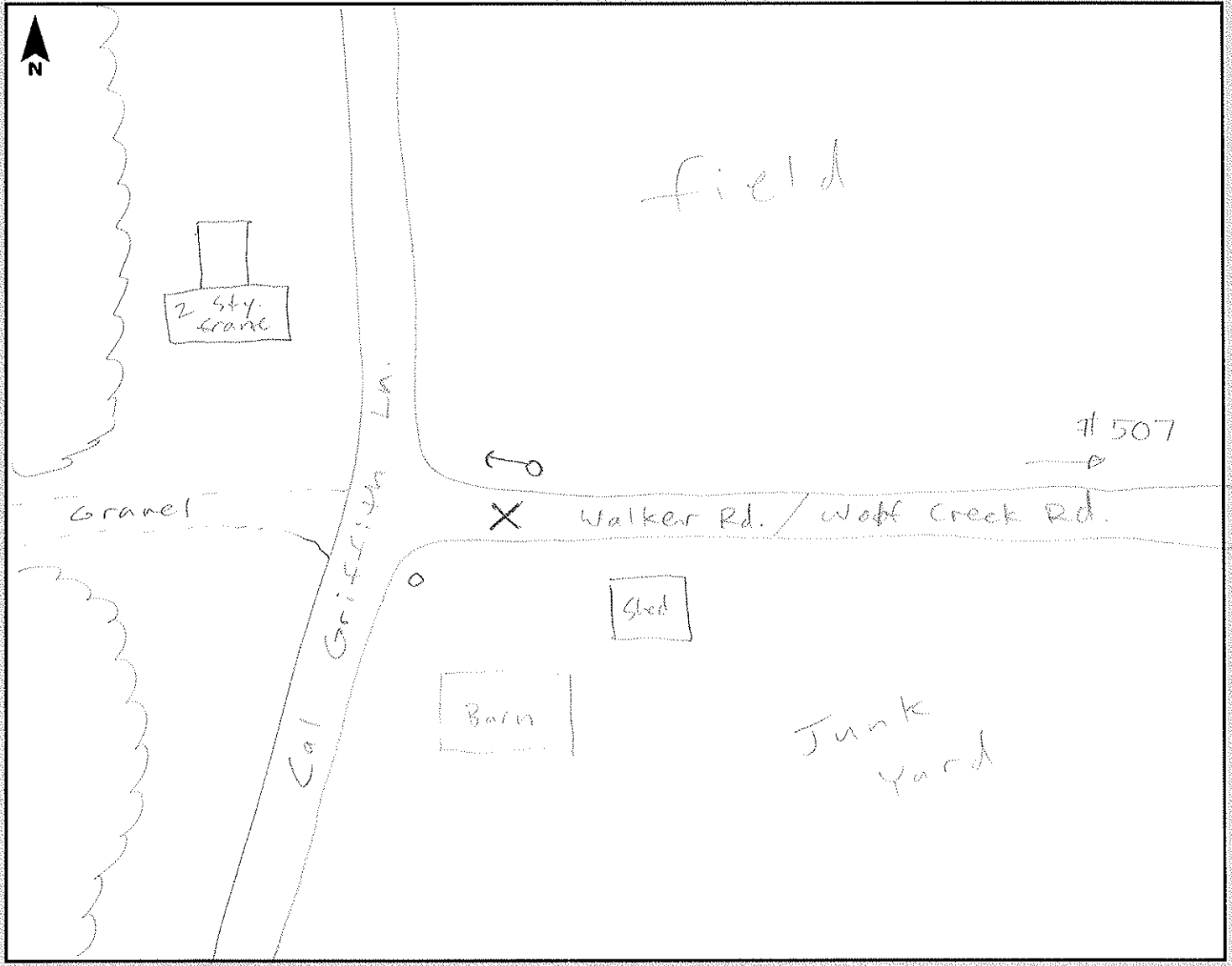
Type of Receiver: Trimble RB-2 4718132112

Stamping on Mark: pavement

Type of Antenna: N/A

Weather Condition: 50's cloudy + windy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Teon Mines

Project Number: 71278 Survey Date: 3/1/11

Station Name: 1003

Operator Name: Bloke

Latitude: N 36-26-20

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-18-42

Start Time: 12:05 End Time: 12:25

Ellip. Height: \_\_\_\_\_

Data File Name: 031111Tnds

Type of Mark: G/S

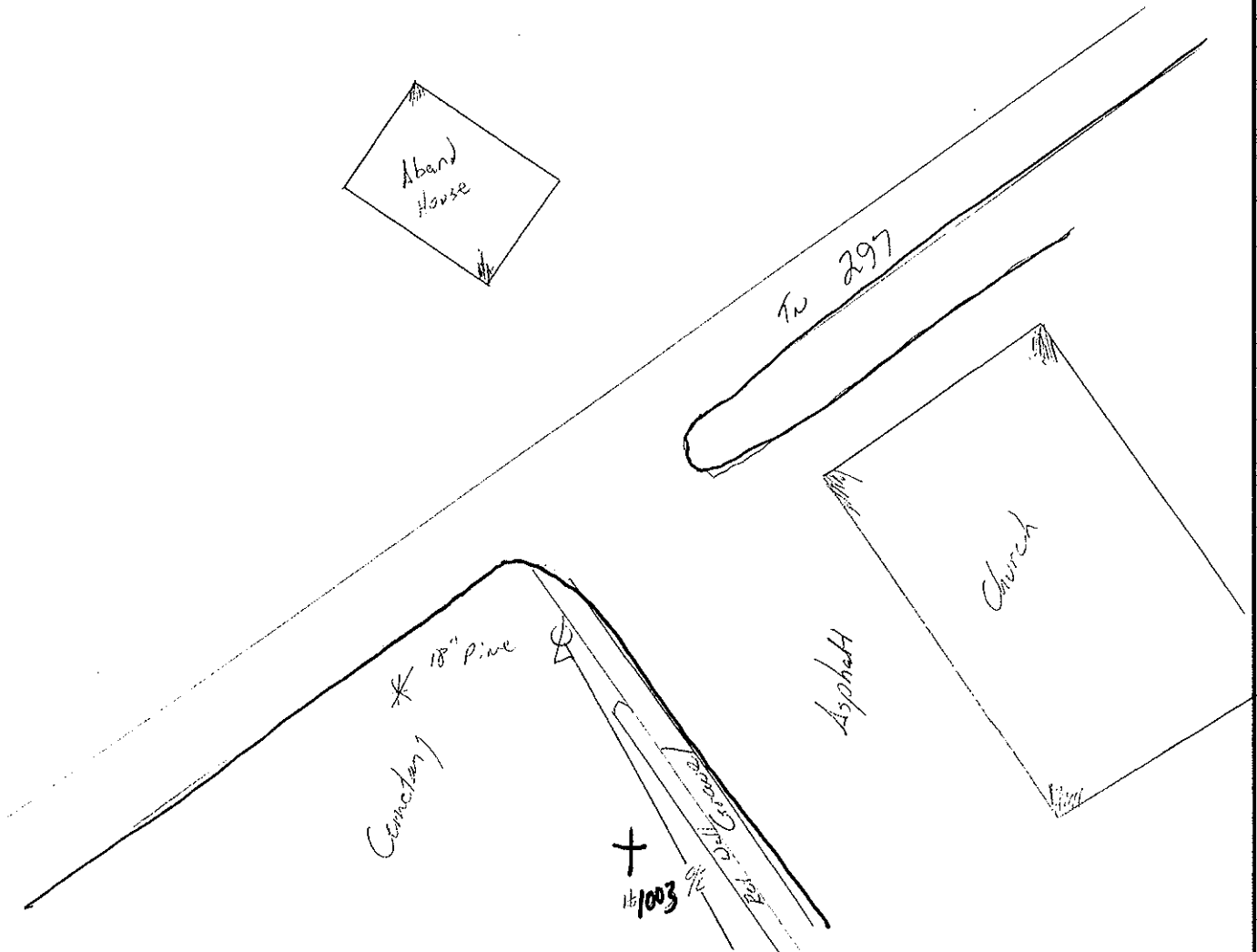
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Ply Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: 1004

Operator Name: Blaker

Latitude: N 36-26-56.6

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-13-25.5

Start Time: 1:13 End Time: 1:33

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND5

Type of Mark: G/S

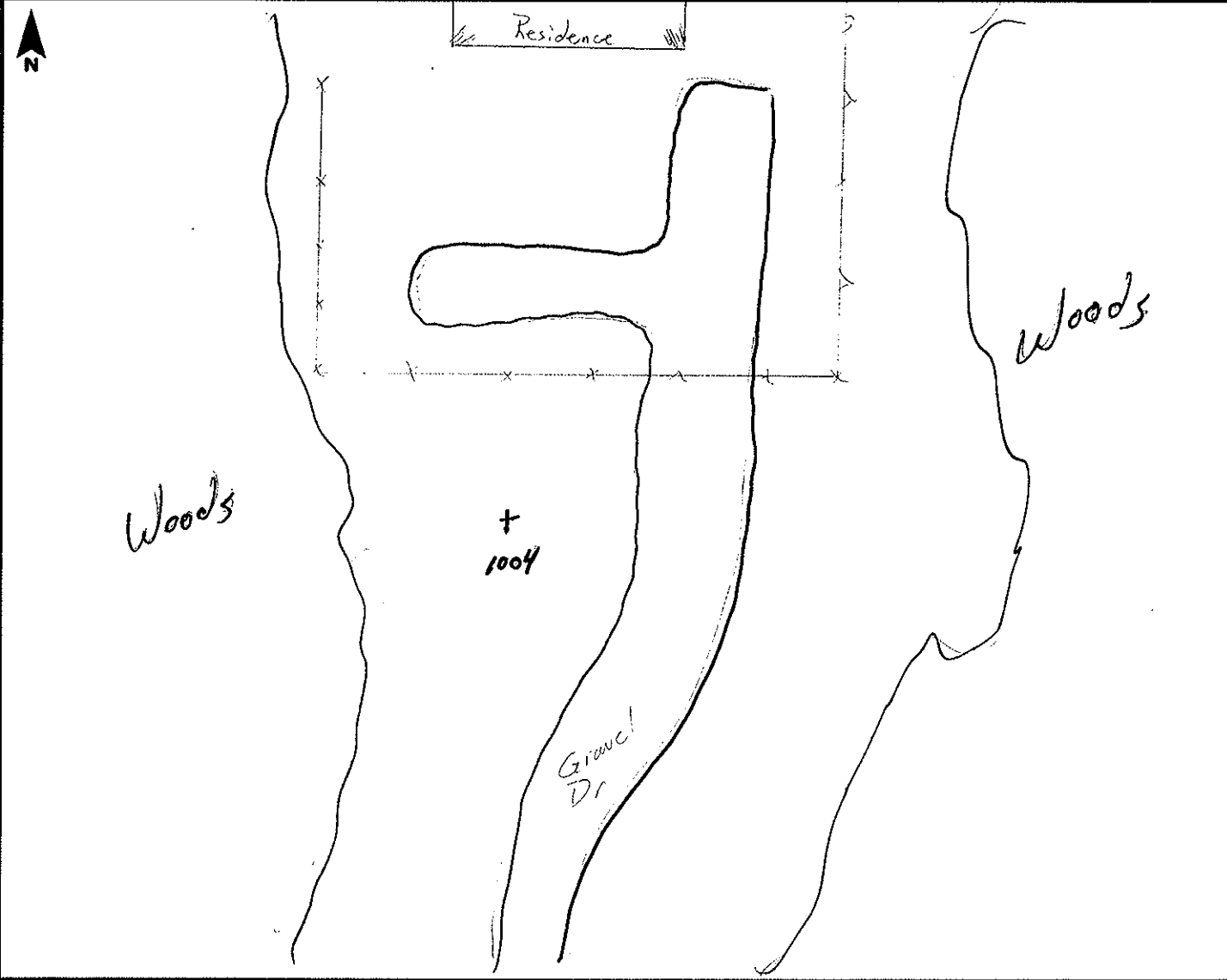
Type of Receiver: RP

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Partly Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 1005

Operator Name: Blaker

Latitude: N 36-29-54.8

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-04-18

Start Time: 10:21 End Time: 10:51

Ellip. Height: \_\_\_\_\_

Data File Name: 031011TN db

Type of Mark: G/S

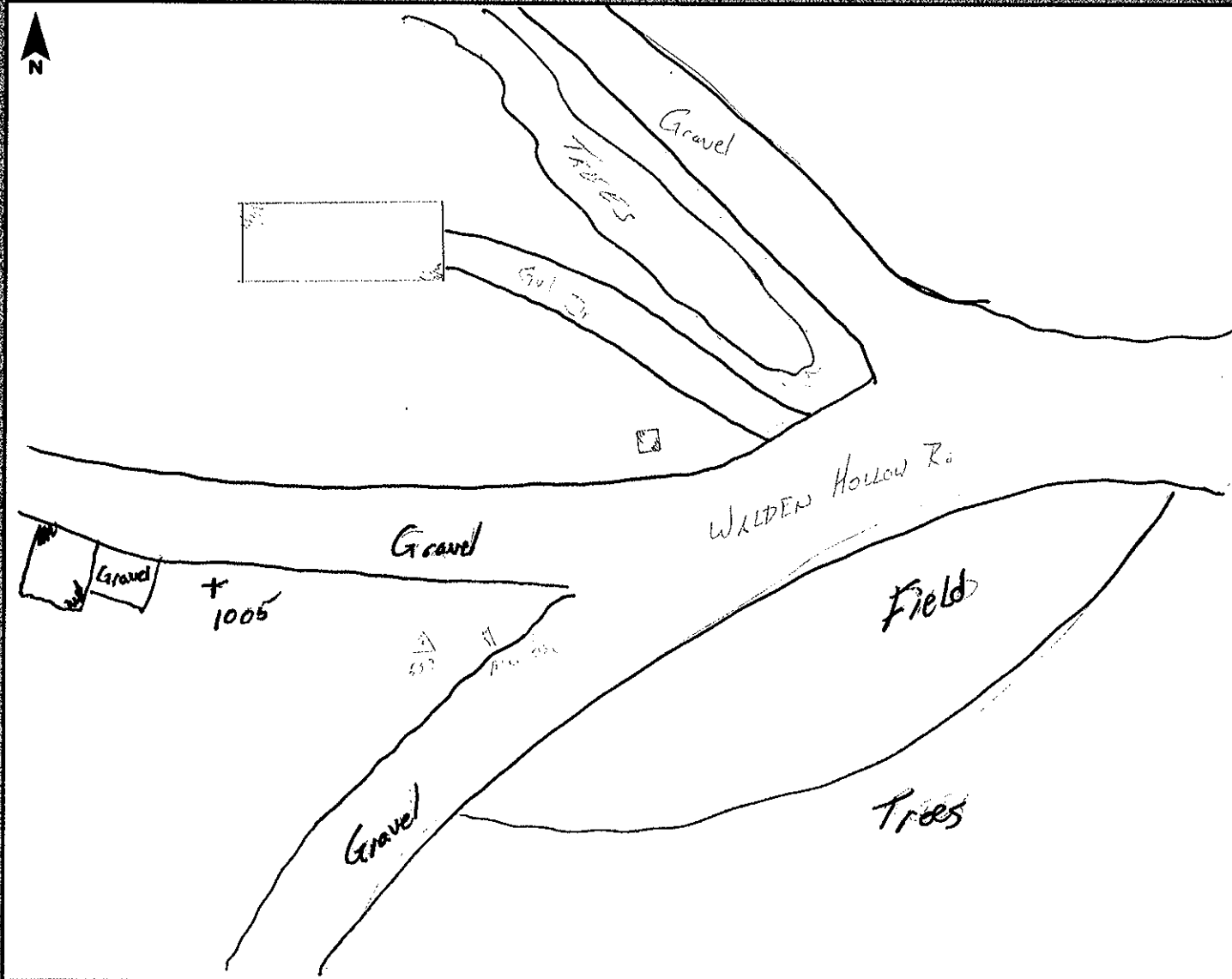
Type of Receiver: RB

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: 1006

Operator Name: Blaker

Latitude: N 36-23-50.7

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-07-32.1

Start Time: 2:33 End Time: 3:03

Ellip. Height: \_\_\_\_\_

Data File Name: 031011Tndb

Type of Mark: G/S

Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

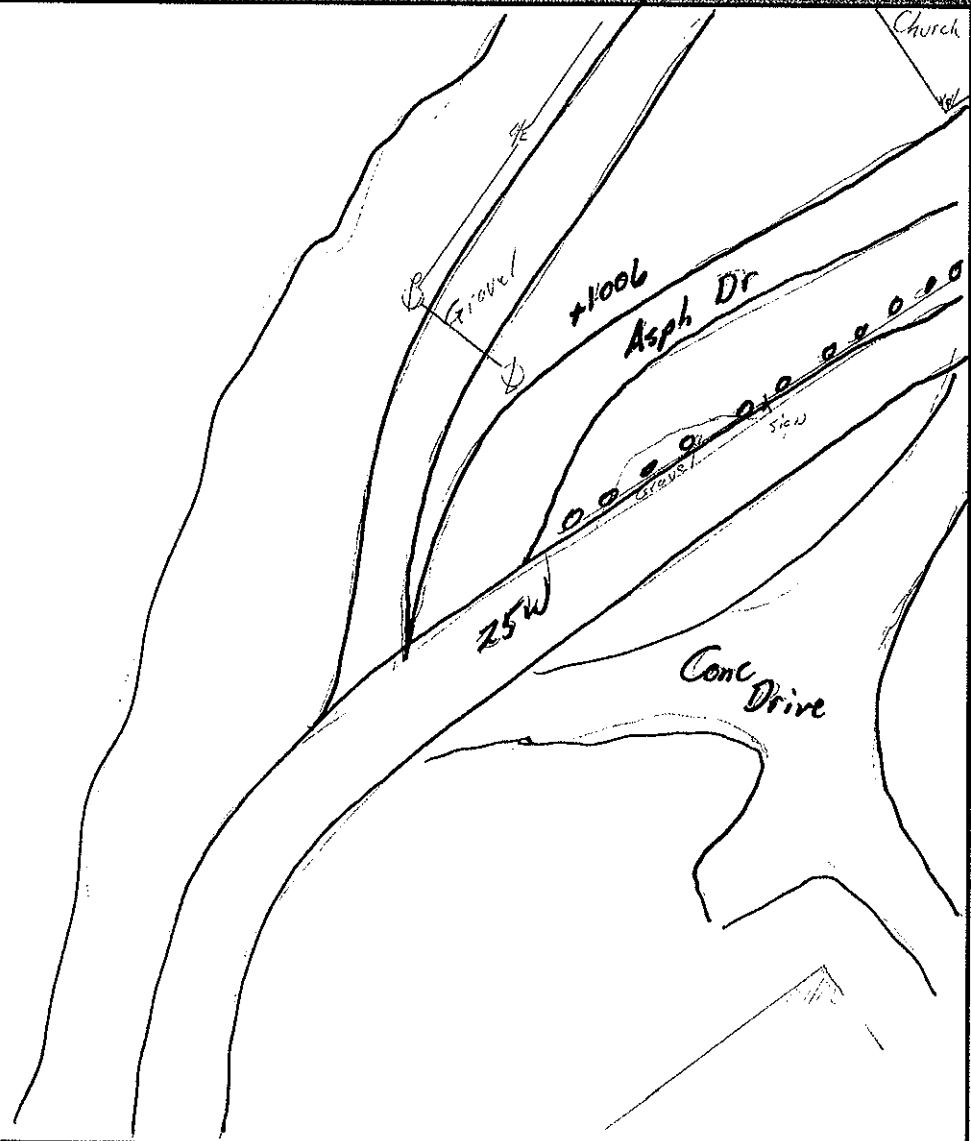
Type of Antenna: \_\_\_\_\_

Weather Condition: Rain

Antenna Height: 2.000m to bottom of antenna mount



Woods



E & W

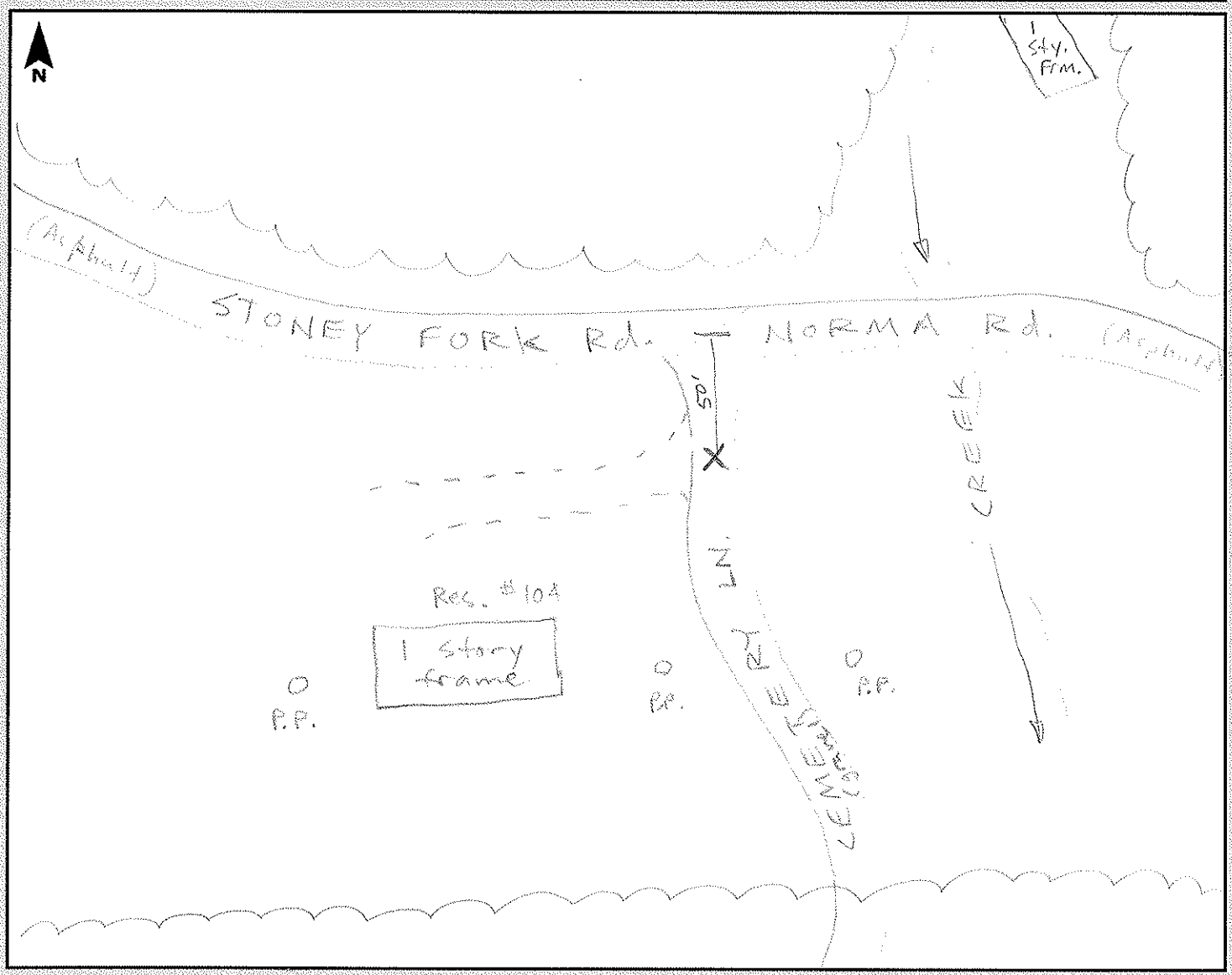


# GPS Observation Log Sheet



Project Name: Tenn. Mines  
 Station Name: 1008  
 Latitude: 36-14-52.1 N  
 Longitude: 84-17-05.2 W  
 Ellip. Height: \_\_\_\_\_  
 Type of Mark: ground shot  
 Stamping on Mark: gravel  
 Weather Condition: 50's partly cloudy

Project Number: 71278 Survey Date: 3/11/11  
 Operator Name: Bill Cutshall  
 Julian Day: 70 Session No. 4  
 Start Time: 18:18 End Time: 18:49  
 Data File Name: 21120706.T01  
 Type of Receiver: Trimble RB-2 4718132112  
 Type of Antenna: N/A  
 Antenna Height: 2.000m to bottom of antenna mount







# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: 1009

Operator Name: Blaker

Latitude: N 36-19-37.3

Julian Day: \_\_\_\_\_ Session No. \_\_\_\_\_

Longitude: W 84-22-08.5

Start Time: 4:51 End Time: 5:11

Ellip. Height: \_\_\_\_\_

Data File Name: 031111T2D5

Type of Mark: G/S

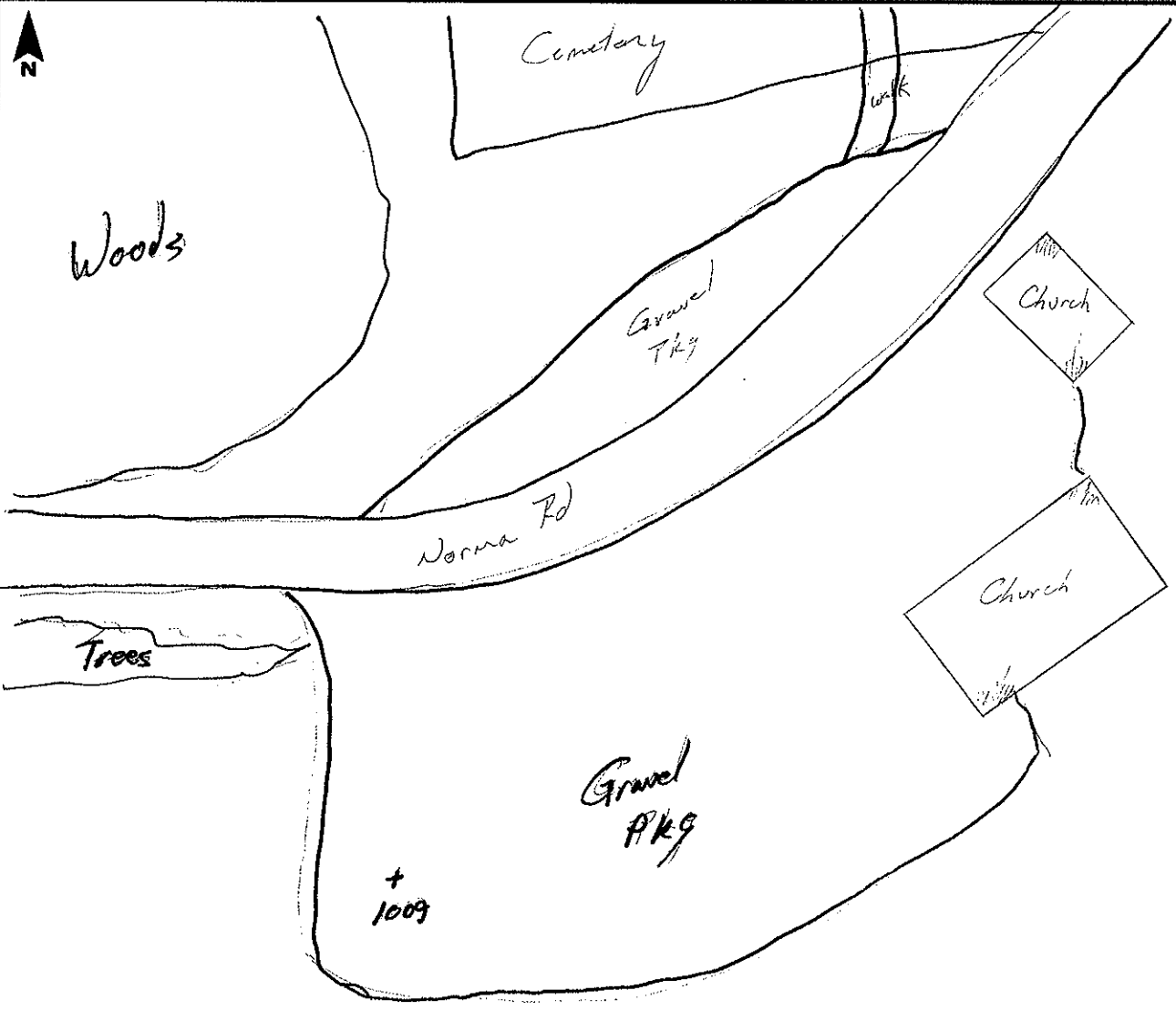
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Sunny

Antenna Height: 2.000m to bottom of antenna mount



NE + SW



# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 1010

Operator Name: Bill Cutshall

Latitude: 36-08-37.7 N

Julian Day: 67 Session No. 1

Longitude: 84-19-05.5 W

Start Time: 17:48 End Time: 18:18

Ellip. Height: \_\_\_\_\_

Data File Name: 21120676.T01

Type of Mark: ground shot

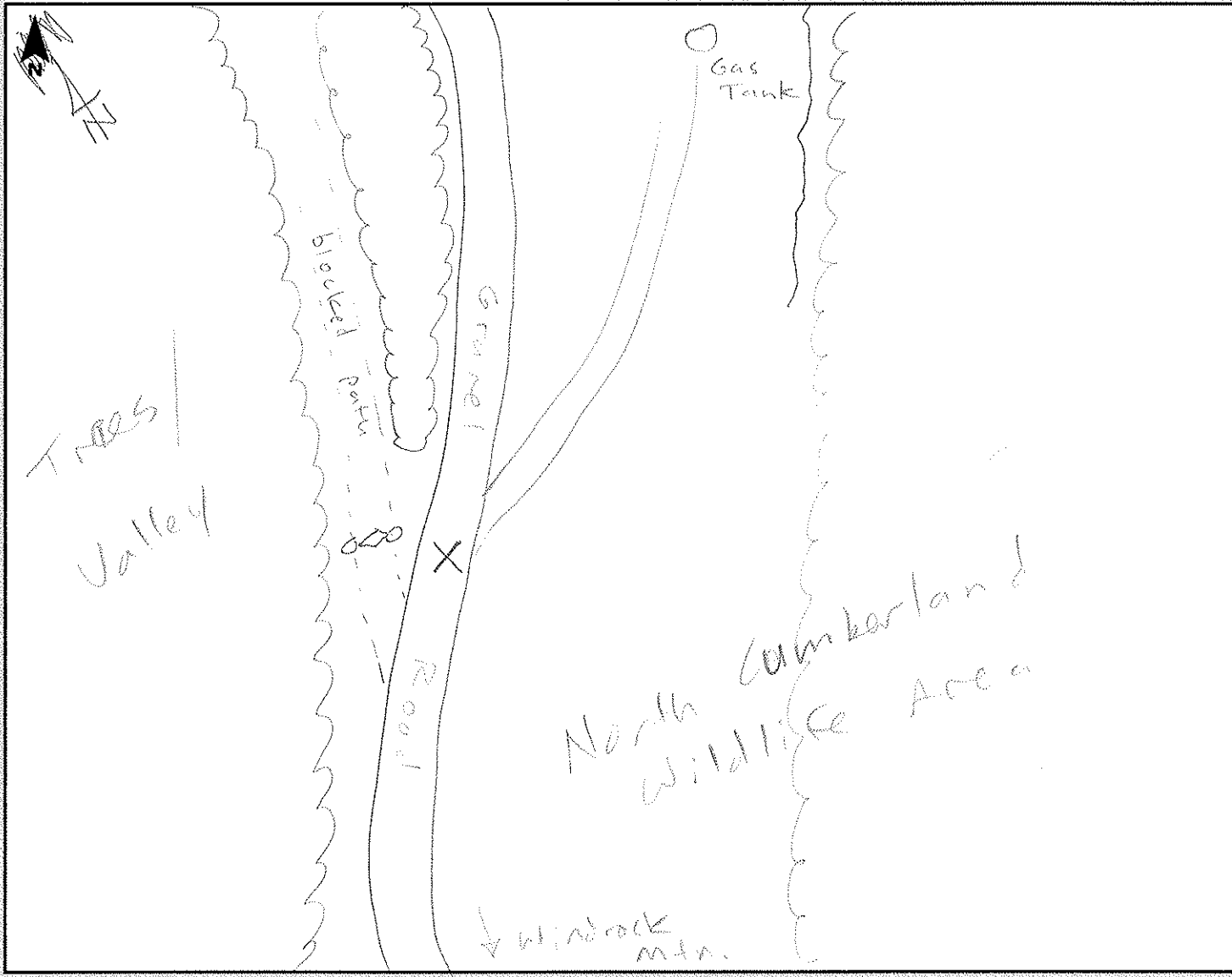
Type of Receiver: Trimble R8-2 4718132112

Stamping on Mark: \_\_\_\_\_

Type of Antenna: N/A

Weather Condition: 50's raining

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 1011

Operator Name: Blahm

Latitude: N 36-09-22

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 84-22-35.4

Start Time: 3:59 End Time: 4:29

Ellip. Height: \_\_\_\_\_

Data File Name: 030911TWd6

Type of Mark: G/S 1011

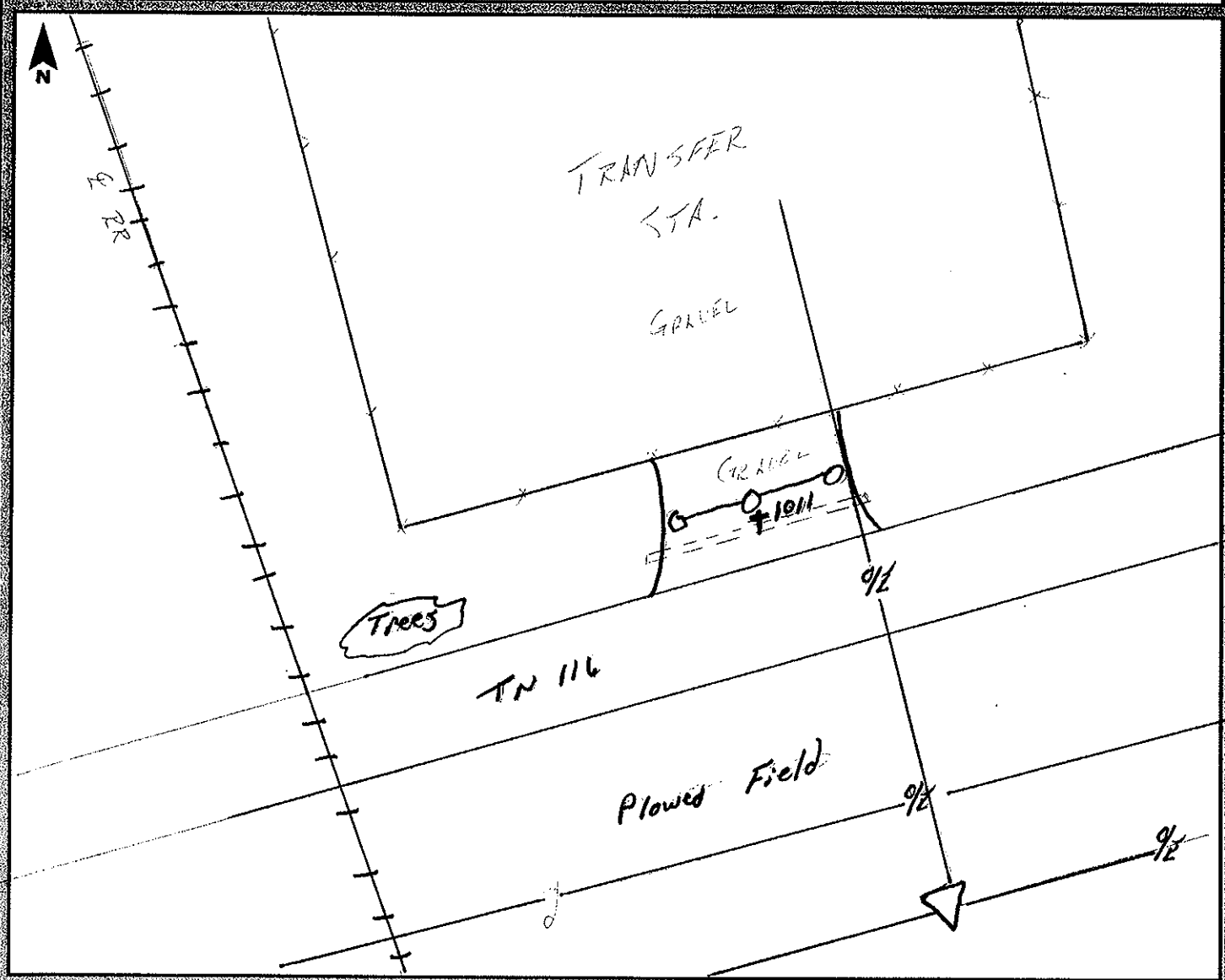
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Run

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/11/31

Station Name: 1012

Operator Name: Blaker

Latitude: N 36-22-01.9

Julian Day: \_\_\_\_\_ Session No. 4

Longitude: W 84-13-58.5

Start Time: 5:42 End Time: 6:02

Ellip. Height: \_\_\_\_\_

Data File Name: 031111TND6

Type of Mark: G/S

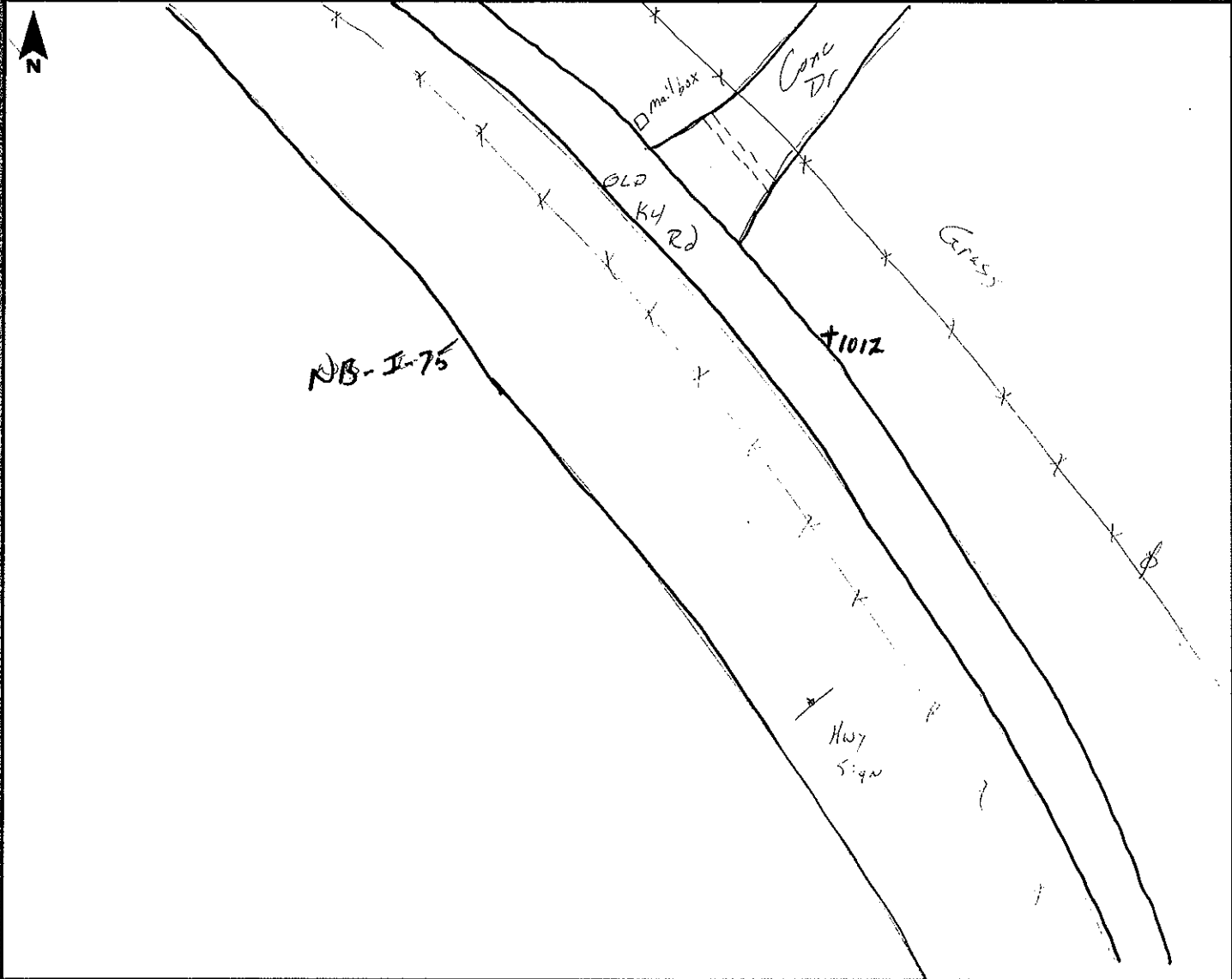
Type of Receiver: RP

Stamping on Mark: —

Type of Antenna: \_\_\_\_\_

Weather Condition: Sunny

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/9/11

Station Name: 1013

Operator Name: BLAKER

Latitude: N 36-10-15

Julian Day: \_\_\_\_\_ Session No. 2

Longitude: W 84-30-07.6

Start Time: 12:01 End Time: 12:31

Ellip. Height: \_\_\_\_\_

Data File Name: 030911TND6

Type of Mark: G/S

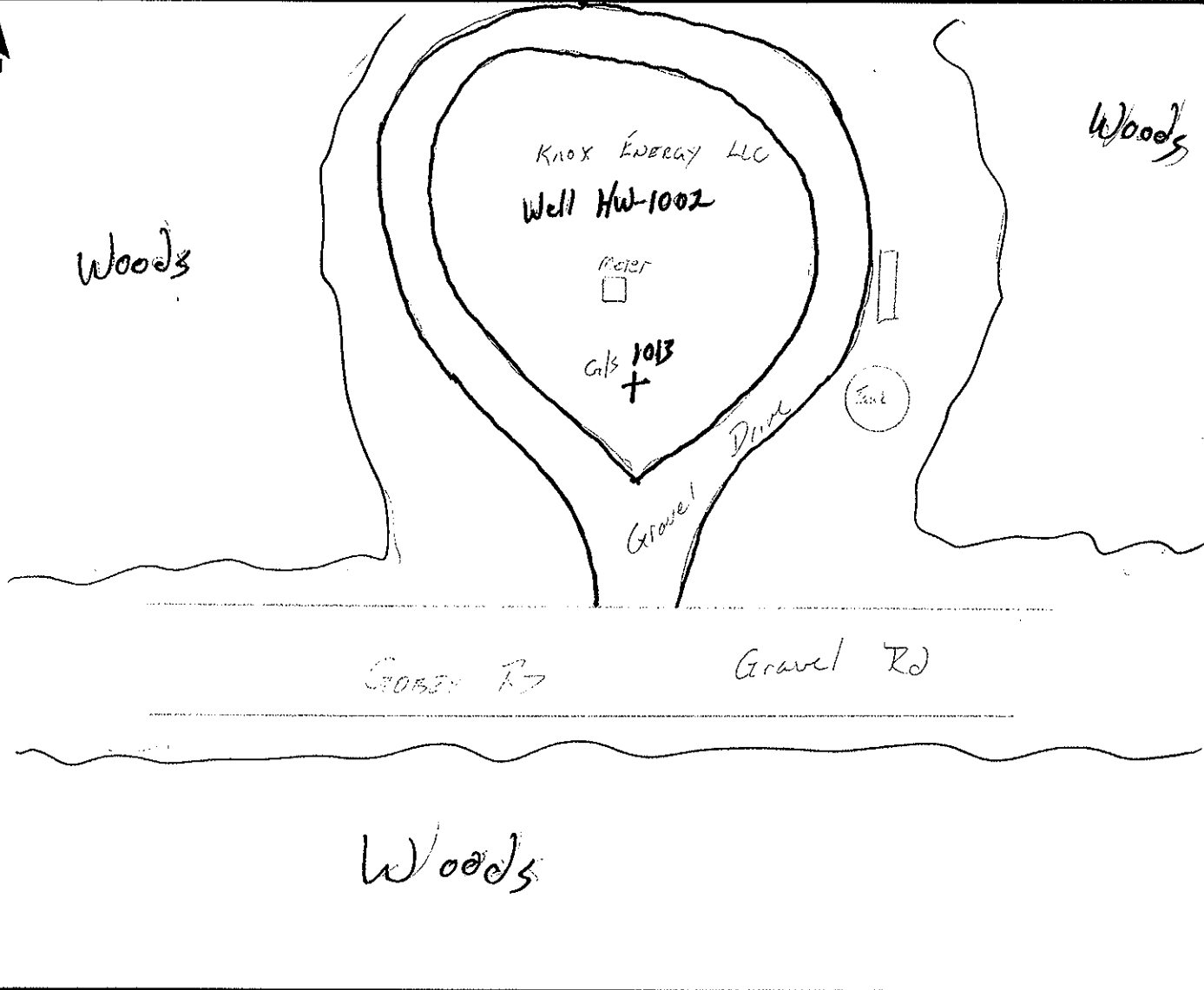
Type of Receiver: R8

Stamping on Mark: \_\_\_\_\_

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy / Windy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: #0 Tenn Mines

Project Number: 71278 Survey Date: 3/8/11

Station Name: 1014

Operator Name: Blacker

Latitude: N 36-09-48.5

Julian Day: \_\_\_\_\_ Session No. 1

Longitude: W 84-37-34.9

Start Time: 11:49 End Time: 12:20

Ellip. Height: \_\_\_\_\_

Data File Name: 030811TND6

Type of Mark: G/S

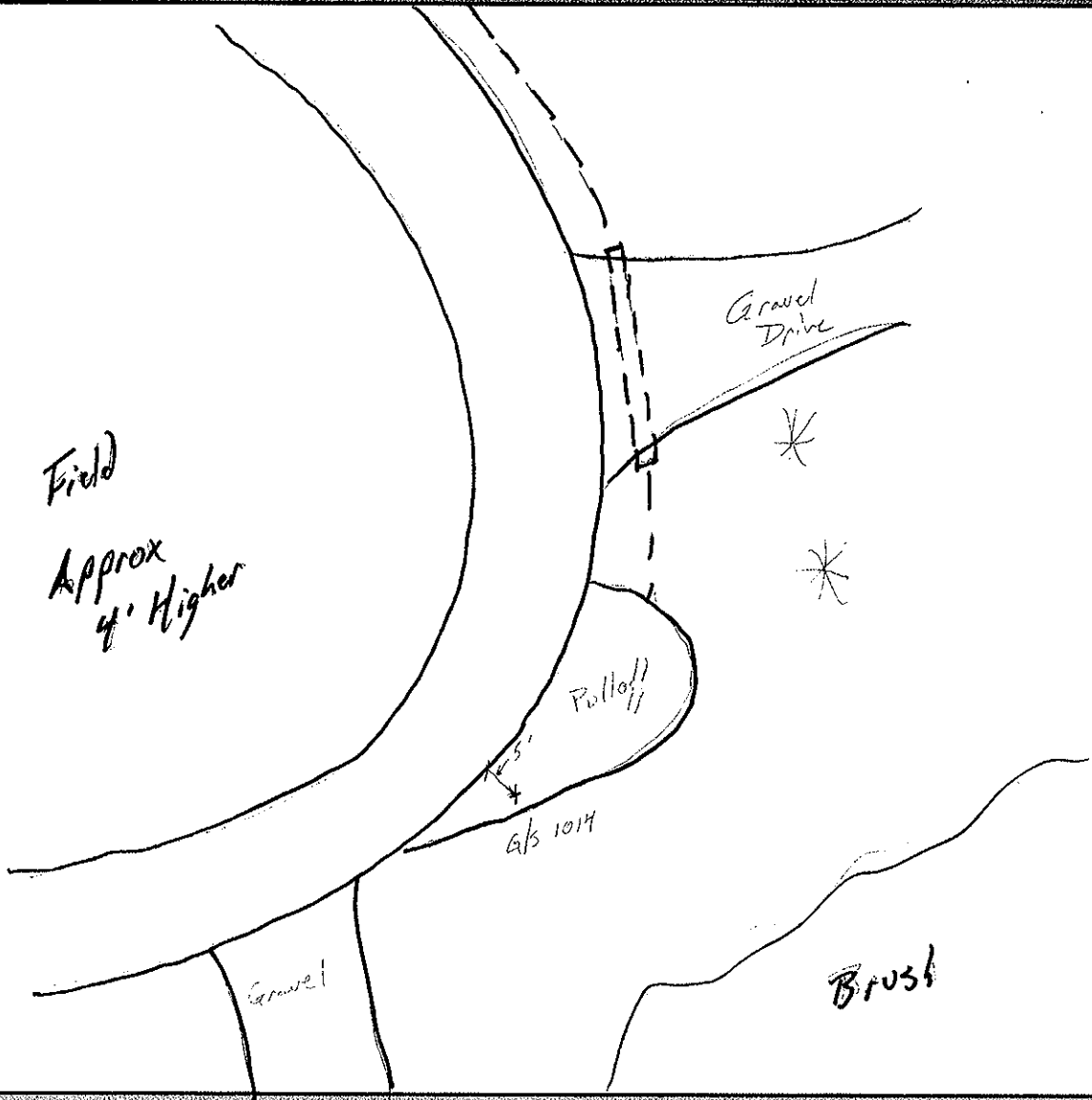
Type of Receiver: R8

Stamping on Mark: Grass

Type of Antenna: \_\_\_\_\_

Weather Condition: Cloudy

Antenna Height: 2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn Mines

Project Number: 71278 Survey Date: 3/10/11

Station Name: GPS-6

Operator Name: Blaker

Latitude: N 36-24-50.2

Julian Day: \_\_\_\_\_ Session No. 3

Longitude: W 84-16-51.6

Start Time: 8:40 End Time: 7 pm

Ellip. Height: 532

Data File Name: 031011TND6

Type of Mark: MINUMENT

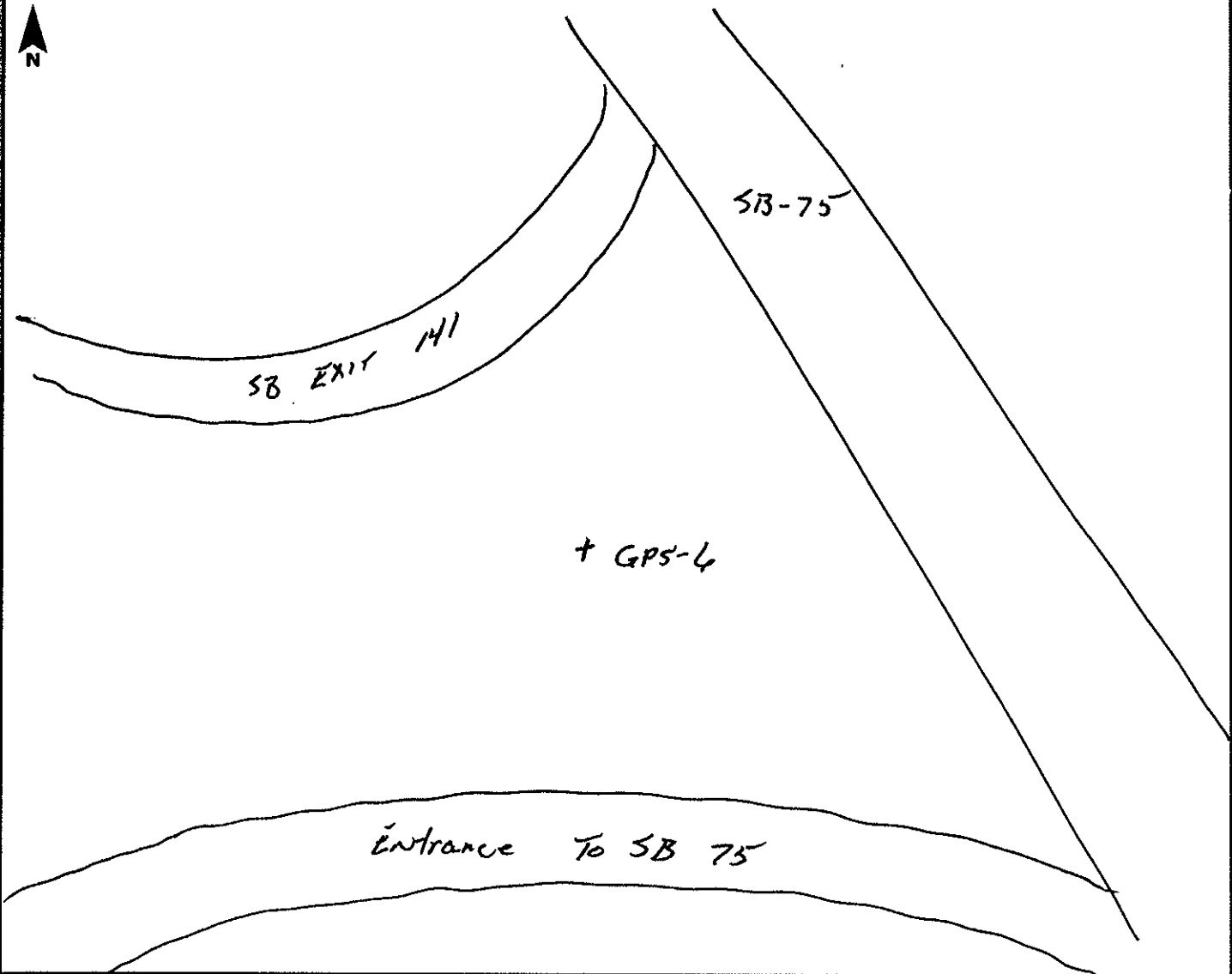
Type of Receiver: 5800

Stamping on Mark: GPS-6

Type of Antenna: \_\_\_\_\_

Weather Condition: RAIN

Antenna Height: 2.75m  
2.000m to bottom of antenna mount





# GPS Observation Log Sheet



Project Name: Tenn. Mines Project Number: 71278 Survey Date: 3/11/11  
Station Name: GPS 7 Operator Name: Bill Cutshall  
Latitude: 36-21-32.1 N Julian Day: 70 Session No. 4  
Longitude: 84-49-55.9 W Start Time: 10:40 End Time: 11:15  
Ellip. Height: \_\_\_\_\_ Data File Name: 21120701.T01  
Type of Mark: Vert. Control Mark Type of Receiver: Trimble R8-2 471813212  
Stamping on Mark: GPS 7 1987 Type of Antenna: N/A  
Weather Condition: 50's cloudy Antenna Height: 2.000m to bottom of antenna mount



See sketch  
from 3/10/11

receiver battery was low and would not connect to controller for end survey. ended survey by holding receiver power button.





# GPS Observation Log Sheet



Project Name: Tenn. Mines

Project Number: 71278 Survey Date: 3/11/11

Station Name: K 231

Operator Name: Bill Cutshall

Latitude: 36-06-05.8 N

Julian Day: 70 Session No. 4

Longitude: 85-14-09.2 W

Start Time: 9:15 End Time: 9:45

Ellip. Height: \_\_\_\_\_

Data File Name: 21120700.T01

Type of Mark: 3 1/2" Disc USCGS

Type of Receiver: Trimble R8-2 4719132112

Stamping on Mark: K 231 1960

Type of Antenna: N/A

Weather Condition: 40's cloudy

Antenna Height: 2.000m to bottom of antenna mount



see sketch  
from 3/10/11



# GPS Observation Log Sheet



Project Name: Tenn. Mines Project Number: 71278 Survey Date: 3/11/11  
Station Name: Q 197 Operator Name: Bill Cutshall  
Latitude: 36-29-13.6 N Julian Day: 70 Session No. 4  
Longitude: 84-31-47.5 W Start Time: 12:21 End Time: 12:51  
Ellip. Height: \_\_\_\_\_ Data File Name: 21120702.T01  
Type of Mark: 3 1/2" Disc USCGS Type of Receiver: Trimble R8-2 4718132112  
Stamping on Mark: Q197 1950 Type of Antenna: N/A  
Weather Condition: 50% Cloudy Antenna Height: 2.000m to bottom of antenna mount



See sketch  
from 3/9/11



# GPS Observation Log Sheet



Project Name: Tenn. Mines Project Number: 71278 Survey Date: 3/11/11  
Station Name: U 201 Operator Name: Bill Cutshall  
Latitude: 36-28-16.8 N Julian Day: 70 Session No. 4  
Longitude: 84-15-13.2 W Start Time: 13:35 End Time: 14:06  
Ellip. Height: \_\_\_\_\_ Data File Name: 21120703.T01  
Type of Mark: 3 1/2" D30 USCGS Type of Receiver: Trimble R8-Z 4718132112  
Stamping on Mark: U 201 1951 Type of Antenna: N/A  
Weather Condition: 50's partly cloudy Antenna Height: 2.000m to bottom of antenna mount



See sketch  
from 3/9/11



# GPS Observation Log Sheet



Project Name:	<u>Tenn. Mines</u>	Project Number:	<u>71278</u>	Survey Date:	<u>3/10/11</u>
Station Name:	<u>Y 195</u>	Operator Name:	<u>Bill Cutshall</u>		
Latitude:	<u>36-02-46.9 N</u>	Julian Day:	<u>69</u>	Session No.:	<u>3</u>
Longitude:	<u>84-18-36.2 W</u>	Start Time:	<u>9:37</u>	End Time:	<u>10:08</u>
Ellip. Height:	<u></u>	Data File Name:	<u>21120690.T01</u>		
Type of Mark:	<u>3 1/2" Disc USCGS</u>	Type of Receiver:	<u>Trimble RB-2 4710132112</u>		
Stamping on Mark:	<u>Y 195 1950</u>	Type of Antenna:	<u>N/A</u>		
Weather Condition:	<u>50% Cloudy</u>	Antenna Height:	<u>2.000m</u>	to bottom of antenna mount	



See sketch  
from 3/8/11

# SECTION 4

SECTION 4



## SECTION 4: EXISTING NGS CONTROL INFORMATION SHEETS

This section contains the published National Geodetic Survey (NGS) Data Sheets used in the final control network for the USGS-OSMRE Tennessee LiDAR project.

# The NGS Data Sheet

See file [dsdata.txt](#) for more information about the datasheet.

```

DATABASE = ,PROGRAM = datasheet, VERSION = 7.86
1 National Geodetic Survey, Retrieval Date = APRIL 11, 2011
DL6169 *****
DL6169 CORS - This is a GPS Continuously Operating Reference Station.
DL6169 DESIGNATION - TDOT DISTRICT 19 CORS ARP
DL6169 CORS_ID - TN19
DL6169 PID - DL6169
DL6169 STATE/COUNTY- TN/SCOTT
DL6169 USGS QUAD - ONEIDA SOUTH (1988)
DL6169
DL6169 *CURRENT SURVEY CONTROL
DL6169
DL6169* NAD 83(CORS)- 36 24 29.93424(N) 084 31 40.99322(W) ADJUSTED
DL6169* NAVD 88 - ** (meters) ** (feet)
DL6169
DL6169 EPOCH DATE - 2002.00
DL6169 X - 490,101.853 (meters) COMP
DL6169 Y - -5,116,157.945 (meters) COMP
DL6169 Z - 3,765,003.321 (meters) COMP
DL6169 ELLIP HEIGHT- 424.719 (meters) (01/??/10) ADJUSTED
DL6169 GEOID HEIGHT- -28.86 (meters) GEOID09
DL6169 HORZ ORDER - SPECIAL (CORS)
DL6169 ELLP ORDER - SPECIAL (CORS)
DL6169
DL6169. ITRF positions are available for this station.
DL6169. The coordinates were established by GPS observations
DL6169. and adjusted by the National Geodetic Survey in January 2010.
DL6169. The coordinates are valid at the epoch date displayed above.
DL6169. The epoch date for horizontal control is a decimal equivalence
DL6169. of Year/Month/Day.
DL6169
DL6169. The PID for the CORS L1 Phase Center is DL6170.
DL6169
DL6169. The XYZ, and position/ellipsoidal ht. are equivalent.
DL6169
DL6169. The ellipsoidal height was determined by GPS observations
DL6169. and is referenced to NAD 83.
DL6169
DL6169. The geoid height was determined by GEOID09.
DL6169
DL6169; North East Units Scale Factor Converg.
DL6169; SPC TN - 231,214.767 732,023.423 MT 0.99999853 +0 51 42.2
DL6169; SPC TN - 758,577.11 2,401,646.85 sFT 0.99999853 +0 51 42.2
DL6169
DL6169! - Elev Factor x Scale Factor = Combined Factor
DL6169! SPC TN - 0.99993335 x 0.99999853 = 0.99993188
DL6169
DL6169 SUPERSEDED SURVEY CONTROL
DL6169
DL6169. No superseded survey control is available for this station.
DL6169
DL6169_U.S. NATIONAL GRID SPATIAL ADDRESS: 16SGF2165732077(NAD 83)
DL6169_MARKER: STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA
DL6169
DL6169 STATION DESCRIPTION
DL6169
DL6169'DESCRIBED BY NATIONAL GEODETIC SURVEY 2010
DL6169'STATION IS A GPS CORS. LATEST INFORMATION INCLUDING POSITIONS AND
DL6169'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
DL6169'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
DL6169' FTP CORS.NGS.NOAA.GOV: CORS/COORD AND CORS/STATION_LOG
DL6169' HTTP://WWW.NGS.NOAA.GOV/CORS.
1 National Geodetic Survey, Retrieval Date = APRIL 11, 2011
GB2656 *****
GB2656 FBN - This is a Federal Base Network Control Station.
GB2656 DESIGNATION - GPS 6
GB2656 PID - GB2656
GB2656 STATE/COUNTY- TN/CAMPBELL

```

GB2656 USGS QUAD - PIONEER (1979)

GB2656

GB2656 \*CURRENT SURVEY CONTROL

GB2656

GB2656*	NAD 83(2007)-	36 24 50.17093(N)	084 16 51.61996(W)	ADJUSTED
GB2656*	NAVD 88	561.72 (meters)	1842.9 (feet)	LEVELING

GB2656

GB2656 EPOCH DATE - 2002.00

GB2656 X - 512,128.824 (meters) COMP

GB2656 Y - -5,113,714.877 (meters) COMP

GB2656 Z - 3,765,569.221 (meters) COMP

GB2656 LAPLACE CORR- -4.98 (seconds) DEFLEC09

GB2656 ELLIP HEIGHT- 532.303 (meters) (02/10/07) ADJUSTED

GB2656 GEOID HEIGHT- -29.41 (meters) GEOID09

GB2656

GB2656 ----- Accuracy Estimates (at 95% Confidence Level in cm) -----

Type	PID	Designation	North	East	Ellip
NETWORK	GB2656	GPS 6	0.61	0.49	1.57

GB2656

GB2656 VERT ORDER - THIRD ?

GB2656

GB2656.The horizontal coordinates were established by GPS observations  
 GB2656.and adjusted by the National Geodetic Survey in February 2007.

GB2656

GB2656.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).  
 GB2656.See [National Readjustment](#) for more information.

GB2656.The horizontal coordinates are valid at the epoch date displayed above.  
 GB2656.The epoch date for horizontal control is a decimal equivalence

GB2656.of Year/Month/Day.

GB2656

GB2656.The orthometric height was determined by differential leveling.

GB2656.The vertical network tie was performed by a horz. field party for horz.

GB2656.obs reductions. Reset procedures were used to establish the elevation.

GB2656

GB2656.The X, Y, and Z were computed from the position and the ellipsoidal ht.

GB2656

GB2656.The Laplace correction was computed from DEFLEC09 derived deflections.

GB2656

GB2656.The ellipsoidal height was determined by GPS observations

GB2656.and is referenced to NAD 83.

GB2656

GB2656.The geoid height was determined by GEOID09.

GB2656

	North	East	Units	Scale	Factor	Converg.
GB2656;SPC TN	- 232,199.679	754,168.864	MT	0.99999952	+1 00	22.9
GB2656;SPC TN	- 761,808.45	2,474,302.35	sFT	0.99999952	+1 00	22.9
GB2656;UTM 16	- 4,033,297.034	743,796.718	MT	1.00033237	+1 36	53.4

GB2656

	Elev Factor	x	Scale Factor	=	Combined Factor
GB2656!SPC TN	- 0.99991647	x	0.99999952	=	0.99991599
GB2656!UTM 16	- 0.99991647	x	1.00033237	=	1.00024881

GB2656

GB2656

	Elev Factor	x	Scale Factor	=	Combined Factor
GB2656!SPC TN	- 0.99991647	x	0.99999952	=	0.99991599
GB2656!UTM 16	- 0.99991647	x	1.00033237	=	1.00024881

GB2656

GB2656

GB2656

GB2656 SUPERSEDED SURVEY CONTROL

GB2656

GB2656 ELLIP H (08/03/04) 532.292 (m) GP( ) 4 1

GB2656 NAD 83(1990)- 36 24 50.17099(N) 084 16 51.61977(W) AD( ) B

GB2656 ELLIP H (09/07/94) 532.285 (m) GP( ) 4 1

GB2656 NAD 83(1990)- 36 24 50.17340(N) 084 16 51.62500(W) AD( ) B

GB2656 ELLIP H (09/07/90) 532.239 (m) GP( ) 4 1

GB2656 NGVD 29 (09/07/90) 562.0 (m) 1844. (f) GPS OBS

GB2656

GB2656.Superseded values are not recommended for survey control.

GB2656.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

GB2656.[See file dsdata.txt](#) to determine how the superseded data were derived.

GB2656

GB2656\_U.S. NATIONAL GRID SPATIAL ADDRESS: 16SGF4379633297(NAD 83)

GB2656\_MARKER: DH = HORIZONTAL CONTROL DISK

GB2656\_SETTING: 66 = SET IN ROCK OUTCROP

GB2656\_SP\_SET: IN DRILL HOLE IN ROCK OUTCROP

GB2656\_STAMPING: GPS 6 1987

GB2656\_MARK LOGO: NGS

GB2656\_MAGNETIC: N = NO MAGNETIC MATERIAL

GB2656\_STABILITY: A = MOST RELIABLE AND EXPECTED TO HOLD

GB2656+STABILITY: POSITION/ELEVATION WELL

GB2656\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

GB2656+SATTELLITE: SATELLITE OBSERVATIONS - December 03, 2008

GB2656

HISTORY	Date	Condition	Report By
GB2656	- 1987	MONUMENTED	NGS
GB2656	- 1987	GOOD	NGS

GB2656

GB2656

GB2656



## DATASHEETS

GB2656 HISTORY - 1988 GOOD AEROS  
 GB2656 HISTORY - 19931013 GOOD NGS  
 GB2656 HISTORY - 19950607 GOOD NGS  
 GB2656 HISTORY - 20031010 GOOD TNDT  
 GB2656 HISTORY - 20050120 GOOD CAS  
 GB2656 HISTORY - 20081203 GOOD

## STATION DESCRIPTION

GB2656 DESCRIBED BY NATIONAL GEODETIC SURVEY 1987 (DAC)  
 GB2656 THE STATION IS LOCATED ABOUT 3.2 KM (2 MI) EAST OF PIONEER, AT THE  
 GB2656 JUNCTION OF INTERSTATE 75 AND STINKING CREEK ROAD (EXIT 144).  
 GB2656 OWNERSHIP--ROAD RIGHT-OF-WAY.  
 GB2656 THE STATION IS LOCATED AT THE JUNCTION OF INTERSTATE 75 AND STINKING  
 GB2656 CREEK ROAD (EXIT 144) ON THE HIGH SPOT IN THE TRIANGLE PLOT OF  
 GB2656 GROUND FORMED BY THE EXIT AND ENTRANCE RAMPS OF SOUTHBOUND  
 GB2656 INTERSTATE 75.

GB2656 THE STATION IS A STANDARD NGS DISK  
 GB2656 STAMPED---GPS 6 1987---,  
 GB2656 SET INTO A DRILL HOLE IN BEDROCK OUTCROP MEASURING 0.9 METERS (3  
 GB2656 FT) BY 0.5 METERS (1.5 FT). LOCATED  
 GB2656 39.3 METERS (129 FT) NORTH FROM THE ENTRANCE RAMP CENTERLINE,  
 GB2656 35.4 METERS (116 FT) EAST FROM THE EXIT RAMP CENTERLINE,  
 GB2656 28.0 METERS (92 FT) SOUTHWEST FROM THE CENTERLINE OF THE SOUTHBOUND  
 GB2656 LANES AND 0.6 METERS (2 FT) ABOVE SAME,  
 GB2656 0.23 METERS (0.75 FT) SOUTH-SOUTHEAST FROM A FIBERGLASS WITNESS POST  
 GB2656 CEMENTED IN THE ROCK.

## STATION RECOVERY (1987)

GB2656 RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987  
 GB2656 RECOVERED IN GOOD CONDITION.

## STATION RECOVERY (1988)

GB2656 RECOVERY NOTE BY AERO SERVICE CORPORATION 1988 (JKP)  
 GB2656 THE STATION WAS RECOVERED AT THIS DATE.  
 GB2656 THE STATION WAS RECOVERED IN GOOD CONDITION AS DESCRIBED BY D. A. C.  
 GB2656 IN 1987.

## STATION RECOVERY (1993)

GB2656 RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993  
 GB2656 THE STATION IS LOCATED ABOUT 14.4 KM (8.95 MI) NORTHWEST OF CARYVILLE,  
 GB2656 4.8 KM (3.00 MI) SOUTHEAST OF TERRY CREEK AND 3.2 KM (2.00 MI) EAST  
 GB2656 OF PIONEER. OWNERSHIP-- HIGHWAY RIGHT-OF-WAY.  
 GB2656 THE STATION IS 0.6 M (2.0 FT) ABOVE THE LEVEL OF THE HIGHWAY. LOCATED  
 GB2656 AT THE JUNCTION OF INTERSTATE HIGHWAY 75 AND STINKING CREEK ROAD  
 GB2656 (EXIT 144), ON THE HIGH SPOT OF THE TRIANGLE PLOT OF GROUND FORMED BY  
 GB2656 THE EXIT AND ENTRANCE RAMPS OF THE SOUTHBOUND LANES OF INTERSTATE  
 GB2656 HIGHWAY 75, SET IN A ROCK OUTCROP 39.3 M (128.9 FT) NORTH FROM THE  
 GB2656 CENTERLINE OF THE ENTRANCE RAMP, 35.4 M (116.1 FT) EAST FROM THE  
 GB2656 CENTERLINE OF THE EXIT RAMP, 28.0 M (91.9 FT) SOUTHWEST FROM THE  
 GB2656 CENTERLINE OF THE SOUTHBOUND LANES OF THE HIGHWAY AND 0.23 M  
 GB2656 (0.75 FT) SOUTH-SOUTHEAST FROM A FIBERGLASS WITNESS POST CEMENTED IN  
 GB2656 THE ROCK.

## STATION RECOVERY (1995)

GB2656 RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (CFS)  
 GB2656 RECOVERED AS DESCRIBED.

## STATION RECOVERY (2003)

GB2656 RECOVERY NOTE BY TN DEPT OF TRANSP 2003  
 GB2656 RECOVERED AS DESCRIBED.

## STATION RECOVERY (2005)

GB2656 RECOVERY NOTE BY CONTINENTAL AERIAL SURVEY INCO 2005 (JDA)  
 GB2656 RECOVERED IN GOOD CONDITION.

## STATION RECOVERY (2008)

GB2656 RECOVERY NOTE BY 2008 (JTZ)  
 GB2656 DESCRIPTION IS ADEQUATE  
 GB2656 32.3 M (105.8 FT) NORTHEAST FROM 2 FT BY 4 FT CONCRETE CATCH BASIN  
 GB2656

```

GB2657 *****
GB2657 CBN - This is a Cooperative Base Network Control Station.
GB2657 DESIGNATION - GPS 7
GB2657 PID - GB2657
GB2657 STATE/COUNTY- TN/FENTRESS
GB2657 USGS QUAD - BURRVILLE (1979)
GB2657
GB2657 *CURRENT SURVEY CONTROL
GB2657
GB2657* NAD 83(2007)- 36 21 32.15055(N) 084 49 55.88968(W) ADJUSTED
GB2657* NAVD 88 - 485.65 (meters) 1593.3 (feet) N HEIGHT
GB2657
GB2657 EPOCH DATE - 2002.00
GB2657 X - 463,232.590 (meters) COMP
GB2657 Y - -5,121,950.811 (meters) COMP
GB2657 Z - 3,760,610.300 (meters) COMP
GB2657 LAPLACE CORR- 1.73 (seconds) DEFLEC09
GB2657 ELLIP HEIGHT- 456.791 (meters) (02/10/07) ADJUSTED
GB2657 GEOID HEIGHT- -28.85 (meters) GEOID09
GB2657 DYNAMIC HT - 485.23 (meters) 1592.0 (feet) COMP
GB2657
GB2657 ----- Accuracy Estimates (at 95% Confidence Level in cm) -----
GB2657 Type PID Designation North East Ellip
GB2657
GB2657 NETWORK GB2657 GPS 7 0.65 0.53 1.65
GB2657
GB2657 MODELED GRAV- 979,750.7 (mgal) NAVD 88
GB2657
GB2657 VERT ORDER - THIRD
GB2657
GB2657.The horizontal coordinates were established by GPS observations
GB2657.and adjusted by the National Geodetic Survey in February 2007.
GB2657
GB2657.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
GB2657.See National Readjustment for more information.
GB2657.The horizontal coordinates are valid at the epoch date displayed above.
GB2657.The epoch date for horizontal control is a decimal equivalence
GB2657.of Year/Month/Day.
GB2657
GB2657.The orthometric height was determined by differential leveling
GB2657.and adjusted in August 1996.
GB2657.The height was determined by precise leveling from only one NSRS
GB2657.bench mark. This was not adequate "tie leveling" to NSRS and was
GB2657.allowed ONLY to validate the GPS-derived height.
GB2657
GB2657.The X, Y, and Z were computed from the position and the ellipsoidal ht.
GB2657
GB2657.The Laplace correction was computed from DEFLEC09 derived deflections.
GB2657
GB2657.The ellipsoidal height was determined by GPS observations
GB2657.and is referenced to NAD 83.
GB2657
GB2657.The geoid height was determined by GEOID09.
GB2657
GB2657.The dynamic height is computed by dividing the NAVD 88
GB2657.geopotential number by the normal gravity value computed on the
GB2657.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
GB2657.degrees latitude (g = 980.6199 gals.).
GB2657
GB2657.The modeled gravity was interpolated from observed gravity values.
GB2657
GB2657;
GB2657;SPC TN - North East Units Scale Factor Converg.
GB2657;SPC TN - 225,367.300 704,811.204 MT 0.99999027 +0 41 01.3
GB2657;UTM 16 - 4,025,942.317 694,504.139 sFT 1.00006614 +0 41 01.3
GB2657
GB2657! - Elev Factor x Scale Factor = Combined Factor
GB2657!SPC TN - 0.99992831 x 0.99999027 = 0.99991859
GB2657!UTM 16 - 0.99992831 x 1.00006614 = 0.99999445
GB2657
GB2657 SUPERSEDED SURVEY CONTROL
GB2657
GB2657 ELLIP H (08/03/04) 456.777 (m) GP( ) 4 1
GB2657 NAD 83(1990)- 36 21 32.15041(N) 084 49 55.88927(W) AD( ) B
GB2657 ELLIP H (09/07/94) 456.818 (m) GP( ) 4 1
GB2657 NAD 83(1990)- 36 21 32.15344(N) 084 49 55.89606(W) AD( ) B
GB2657 ELLIP H (09/07/90) 456.713 (m) GP( ) 4 1
GB2657 NAVD 88 (09/07/94) 485.65 (m) 1593.3 (f) LEVELING 3
GB2657 NGVD 29 (??/??/??) 485.76 (m) 1593.7 (f) N HEIGHT 3
GB2657
GB2657.Superseded values are not recommended for survey control.

```

GB2657.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.  
 GB2657. [See file dsdata.txt](#) to determine how the superseded data were derived.  
 GB2657  
 GB2657 U.S. NATIONAL GRID SPATIAL ADDRESS: 16SFF9450425942(NAD 83)  
 GB2657\_MARKER: I = METAL ROD  
 GB2657\_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+) )  
 GB2657\_SP\_SET: DRIVEN INTO GROUND  
 GB2657\_STAMPING: GPS 7 1987  
 GB2657\_MARK LOGO: NGS  
 GB2657\_PROJECTION: FLUSH  
 GB2657\_MAGNETIC: S = STEEL SPIKE IMBEDDED IN MONUMENT  
 GB2657\_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL  
 GB2657\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR  
 GB2657+SATELLITE: SATELLITE OBSERVATIONS - December 03, 2008  
 GB2657\_ROD/PIPE-DEPTH: 1.8 meters  
 GB2657\_SLEEVE-DEPTH : 0.9 meters

HISTORY	- Date	Condition	Report By
GB2657 HISTORY	- 1987	MONUMENTED	NGS
GB2657 HISTORY	- 1987	GOOD	NGS
GB2657 HISTORY	- 19891006	GOOD	
GB2657 HISTORY	- 19931013	GOOD	NGS
GB2657 HISTORY	- 19940112	GOOD	
GB2657 HISTORY	- 19950608	GOOD	NGS
GB2657 HISTORY	- 20031010	GOOD	TNDT
GB2657 HISTORY	- 20070305	GOOD	TVA
GB2657 HISTORY	- 20081203	GOOD	

GB2657 STATION DESCRIPTION

GB2657'DESCRIBED BY NATIONAL GEODETIC SURVEY 1987 (DAC)  
 GB2657'THE STATION IS LOCATED ABOUT 25.7 KM (16 MI)  
 GB2657'WEST OF ELGIN,  
 GB2657'5.6 KM (3.5 MI) EAST OF ALLARDT, ON THE NORTH SIDE OF STATE ROUTE  
 GB2657'52.

GB2657'OWNERSHIP--ROAD RIGHT-OF-WAY.

GB2657'TO REACH THE STATION FROM THE JUNCTION OF STATE ROUTES 52 AND 296  
 GB2657'IN ALLARDT GO EAST FOR 5.3 KM (3.3 MI) ON STATE ROUTE 52 TO THE  
 GB2657'PLEASANT VIEW CHURCH ON THE RIGHT NEAR A ROAD FORK.  
 GB2657'CONTINUE STRAIGHT AHEAD AND GO EAST FOR 0.3 KM (0.2 MI) ON STATE  
 GB2657'ROUTE 52 TO THE STATION ON THE LEFT. THE STATION CAN ALSO BE  
 GB2657'REACHED FROM THE JUNCTION OF STATE ROUTE 52 AND U.S. HIGHWAY 27 IN  
 GB2657'ELGIN BY GOING WEST FOR 25.9 KM (16.1 MI) ON STATE ROUTE 52 TO THE  
 GB2657'STATION ON THE RIGHT.

GB2657'THE STATION IS A 3-D MARK WITH STAINLESS STEEL ROD DRIVEN 1.8 METERS  
 GB2657'(6 FT). THE LOGO CAP IS STAMPED---GPS 7 1987---, AND A STEEL SPIKE  
 GB2657'IS SET IN THE CONCRETE. LOCATED 91.1 METERS (299 FT) WEST FROM THE  
 GB2657'CENTER OF A GRAVEL DRIVE LEADING NORTH, 7.0 METERS (23 FT) NORTH  
 GB2657'FROM THE CENTERLINE OF STATE ROUTE 52, 2.3 METERS (7.4 FT) SOUTH  
 GB2657'FROM A PROPERTY CORNER MARKED BY AN IRON PIN AND A STEEL FENCE POST,  
 GB2657'0.4 METERS (1.2 FT) SOUTH FROM A FIBERGLASS WITNESS POST.

GB2657 STATION RECOVERY (1987)

GB2657'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987  
 GB2657'RECOVERED IN GOOD CONDITION.

GB2657 STATION RECOVERY (1989)

GB2657'RECOVERED 1989  
 GB2657'RECOVERED IN GOOD CONDITION.

GB2657 STATION RECOVERY (1993)

GB2657'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1993  
 GB2657'THE STATION IS LOCATED ABOUT 28.8 KM (17.90 MI) SOUTH OF THE  
 GB2657'KENTUCKY/TENNESSEE STATE LINE, 25.7 KM (15.95 MI) WEST OF ELGIN AND  
 GB2657'5.6 KM (3.45 MI) EAST OF ALLARDT. OWNERSHIP--HIGHWAY RIGHT-OF-WAY.  
 GB2657'TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAYS 52 AND 296 IN  
 GB2657'ALLARDT, GO EAST-SOUTHEAST ON STATE HIGHWAY 52 FOR 5.3 KM (3.30 MI)  
 GB2657'TO THE PLEASANT VIEW CHURCH ON THE RIGHT NEAR A ROAD FORK, CONTINUE  
 GB2657'AHEAD ON HIGHWAY 52 FOR 0.3 KM (0.20 MI) TO STATION ON THE LEFT. THE  
 GB2657'STATION CAN ALSO BE REACHED FROM THE JUNCTION OF STATE HIGHWAY 52 AND  
 GB2657'U.S. HIGHWAY 27 IN ELGIN BY GOING WEST FOR 25.9 KM (16.10 MI) ON  
 GB2657'STATE HIGHWAY 52 TO THE STATION ON THE RIGHT.  
 GB2657'THE STATION IS LOCATED 91.1 M (298.9 FT) WEST FROM THE CENTER OF A  
 GB2657'GRAVEL DRIVE LEADING NORTH, 7.0 M (23.0 FT) NORTH FROM THE CENTERLINE  
 GB2657'OF THE HIGHWAY, 4.3 M (14.1 FT) SOUTH OF POWERPOLE NUMBER 31GA/1, 2.3  
 GB2657'M (7.5 FT) SOUTH FROM A PROPERTY CORNER MARKED BY AN IRON PIN AND A

GB2657 STEEL FENCE POST AND 0.4 M (1.3 FT) SOUTH FROM A FIBERGLASS WITNESS  
 GB2657 POST.  
 GB2657  
 GB2657 STATION RECOVERY (1994)  
 GB2657  
 GB2657 RECOVERED 1994  
 GB2657 RECOVERED IN GOOD CONDITION.  
 GB2657  
 GB2657 STATION RECOVERY (1995)  
 GB2657  
 GB2657 RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1995 (CFS)  
 GB2657 THE STATION IS LOCATED ABOUT 25.7 KM (15.95 MI) WEST OF ELGIN, 5.6 KM  
 GB2657 (3.45 MI) EAST OF ALLARDT, ON THE NORTH SIDE OF STATE ROUTE 52.  
 GB2657 OWNERSHIP--TENNESSEE DEPARTMENT OF TRANSPORTATION. TO REACH THE  
 GB2657 STATION FROM THE JUNCTION OF STATE ROUTES 52 AND 296 IN ALLARDT, GO  
 GB2657 EAST FOR 5.3 KM (3.30 MI) ON STATE ROUTE 52 TO THE PLEASANT VIEW  
 GB2657 CHURCH ON THE RIGHT NEAR A ROAD FORK. CONTINUE STRAIGHT AHEAD AND GO  
 GB2657 EAST FOR 0.3 KM (0.20 MI) ON STATE ROUTE 52 TO THE STATION ON THE  
 GB2657 LEFT. LOCATED 91.1 M (298.9 FT) WEST FROM THE CENTER OF A GRAVEL  
 GB2657 DRIVE LEADING NORTH, 7.0 M (23.0 FT) NORTH FROM THE CENTERLINE OF  
 GB2657 STATE ROUTE 52, 4.4 M (14.4 FT) SOUTH FROM UTILITY POLE NUMBER 31GA/1,  
 GB2657 2.3 M (7.5 FT) SOUTH FROM A PROPERTY CORNER MARKED BY AN IRON PIN AND  
 GB2657 A STEEL FENCE POST AND 0.4 M (1.3 FT) SOUTH FROM A FIBERGLASS WITNESS  
 GB2657 POST. A STEEL SPIKE IS SET IN THE CONCRETE.  
 GB2657  
 GB2657 STATION RECOVERY (2003)  
 GB2657  
 GB2657 RECOVERY NOTE BY TN DEPT OF TRANSP 2003  
 GB2657 RECOVERED AS DESCRIBED.  
 GB2657  
 GB2657 STATION RECOVERY (2007)  
 GB2657  
 GB2657 RECOVERY NOTE BY TENNESSEE VALLEY AUTHORITY 2007 (CDM)  
 GB2657 RECOVERED IN GOOD CONDITION.  
 GB2657  
 GB2657 STATION RECOVERY (2008)  
 GB2657  
 GB2657 RECOVERY NOTE BY 2008 (JTZ)  
 GB2657 DESCRIPTION IS ADEQUATE  
 GB2657 LOCATED 13.7 M (45 FT.) EAST FROM THE CENTER OF A PAVED DRIVE LEADING  
 GB2657 NORTH TO RESIDENCE 3241 S.R. 52  
 1 National Geodetic Survey, Retrieval Date = APRIL 11, 2011  
 GB0945 \*\*\*\*\*  
 GB0945 CBN - This is a Cooperative Base Network Control Station.  
 GB0945 DESIGNATION - Q 197  
 GB0945 PID - GB0945  
 GB0945 STATE/COUNTY- TN/SCOTT  
 GB0945 USGS QUAD - ONEIDA SOUTH (1988)  
 GB0945  
 GB0945 \*CURRENT SURVEY CONTROL  
 GB0945  
 GB0945 \* NAD 83(2007)- 36 29 13.64273(N) 084 31 47.47958(W) ADJUSTED  
 GB0945 \* NAVD 88 - 453.246 (meters) 1487.02 (feet) ADJUSTED  
 GB0945  
 GB0945 EPOCH DATE - 2002.00  
 GB0945 X - 489,445.650 (meters) COMP  
 GB0945 Y - -5,111,001.043 (meters) COMP  
 GB0945 Z - 3,772,038.155 (meters) COMP  
 GB0945 LAPLACE CORR- -1.54 (seconds) DEFLEC09  
 GB0945 ELLIP HEIGHT- 424.399 (meters) (02/10/07) ADJUSTED  
 GB0945 GEOID HEIGHT- -28.85 (meters) GEOID09  
 GB0945 DYNAMIC HT - 452.862 (meters) 1485.76 (feet) COMP  
 GB0945  
 GB0945 ----- Accuracy Estimates (at 95% Confidence Level in cm) -----  
 GB0945 Type PID Designation North East Ellip  
 GB0945  
 GB0945 NETWORK GB0945 Q 197 0.92 0.73 2.29  
 GB0945  
 GB0945 MODELED GRAV- 979,770.2 (mgal) NAVD 88  
 GB0945  
 GB0945 VERT ORDER - FIRST CLASS I  
 GB0945  
 GB0945 The horizontal coordinates were established by GPS observations  
 GB0945 and adjusted by the National Geodetic Survey in February 2007.  
 GB0945  
 GB0945 The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).  
 GB0945 See [National Readjustment](#) for more information.  
 GB0945 The horizontal coordinates are valid at the epoch date displayed above.  
 GB0945 The epoch date for horizontal control is a decimal equivalence  
 GB0945 of Year/Month/Day.  
 GB0945



GB0945  
 GB0945 STATION RECOVERY (2009)  
 GB0945  
 GB0945 RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 2009 (BC)  
 GB0945 RECOVERED AS DESCRIBED  
 1 National Geodetic Survey, Retrieval Date = APRIL 11, 2011  
 GB0661 \*\*\*\*\*  
 GB0661 DESIGNATION - U 201  
 GB0661 PID - GB0661  
 GB0661 STATE/COUNTY- TN/CAMPBELL  
 GB0661 USGS QUAD - PIONEER (1979)  
 GB0661  
 GB0661 \*CURRENT SURVEY CONTROL  
 GB0661  

GB0661*	NAD 83(1986)-	36 28 17.	(N)	084 15 13.	(W)	SCALED
GB0661*	NAVD 88	- 358.008	(meters)	1174.56	(feet)	ADJUSTED

GB0661	GEOID HEIGHT-	-29.49	(meters)			GEOID09
GB0661	DYNAMIC HT -	357.692	(meters)	1173.53	(feet)	COMP
GB0661	MODELED GRAV-	979,738.8	(mgal)			NAVD 88

  
 GB0661 VERT ORDER - SECOND CLASS 0  
 GB0661  
 GB0661.The horizontal coordinates were scaled from a topographic map and have  
 GB0661.an estimated accuracy of +/- 6 seconds.  
 GB0661  
 GB0661.The orthometric height was determined by differential leveling and  
 GB0661.adjusted in June 1991.  
 GB0661  
 GB0661.The geoid height was determined by GEOID09.  
 GB0661  
 GB0661.The dynamic height is computed by dividing the NAVD 88  
 GB0661.geopotential number by the normal gravity value computed on the  
 GB0661.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45  
 GB0661.degrees latitude (g = 980.6199 gals.).  
 GB0661  
 GB0661.The modeled gravity was interpolated from observed gravity values.  
 GB0661  

GB0661;		North	East	Units	Estimated Accuracy
GB0661;SPC TN	-	238,620.	756,510.	MT	(+/- 180 meters Scaled)

  
 GB0661  
 GB0661 SUPERSEDED SURVEY CONTROL  
 GB0661  

GB0661	NGVD 29 (??/??/92)	358.128	(m)	1174.96	(f)	ADJ UNCH	2 0
--------	--------------------	---------	-----	---------	-----	----------	-----

  
 GB0661  
 GB0661.Superseded values are not recommended for survey control.  
 GB0661.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.  
 GB0661.[See file dsdata.txt](#) to determine how the superseded data were derived.  
 GB0661  
 GB0661\_U.S. NATIONAL GRID SPATIAL ADDRESS: 16SGF460397(NAD 83)  
 GB0661\_MARKER: DB = BENCH MARK DISK  
 GB0661\_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT  
 GB0661\_SP\_SET: SET IN TOP OF CONCRETE MONUMENT  
 GB0661\_STAMPING: U 201 1951 1174.958  
 GB0661\_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO  
 GB0661+STABILITY: SURFACE MOTION  
 GB0661\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR  
 GB0661+SATELLITE: SATELLITE OBSERVATIONS - April 15, 2010  
 GB0661  

GB0661	HISTORY	- Date	Condition	Report By
GB0661	HISTORY	- 1951	MONUMENTED	CGS
GB0661	HISTORY	- 1957	GOOD	NGS
GB0661	HISTORY	- 20100415	GOOD	JCLS

  
 GB0661  
 GB0661 STATION DESCRIPTION  
 GB0661  
 GB0661'DESCRIBED BY COAST AND GEODETIC SURVEY 1951  
 GB0661'1 MI SW FROM ELK VALLEY.  
 GB0661'ABOUT 1.0 MILE SOUTHWEST ALONG THE SOUTHERN RAILWAY FROM THE  
 GB0661'STATION AT ELK VALLEY, ABOUT 0.1 MILE NORTHEAST OF MILE POST  
 GB0661'54, AT A DRIVE WAY CROSSING (SOUTHEAST TO A FARM HOUSE), 27 FEET  
 GB0661'SOUTHEAST OF THE SOUTHEAST RAIL, 13 FEET NORTHEAST OF THE CENTER  
 GB0661'LINE OF DRIVE, 47 1/2 FEET NORTHEAST AND ACROSS DRIVE FROM A  
 GB0661'SIGN STATION ONE MILE, 1 FOOT NORTHWEST OF A FENCE LINE, 2 FEET  
 GB0661'SOUTHWEST OF A WHITE WOODEN WITNESS POST, ABOUT LEVEL WITH THE  
 GB0661'TRACK AND SET IN THE TOP OF A CONCRETE POST PROJECTING 6 INCHES.  
 GB0661  
 GB0661 STATION RECOVERY (1957)  
 GB0661  
 GB0661 RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1957  
 GB0661 RECOVERED IN GOOD CONDITION.

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GB0661
GB0661 STATION RECOVERY (2010)
GB0661
GB0661 RECOVERY NOTE BY JOHN CHANCE LAND SURVEYS INC 2010
GB0661 RECOVERED IN GOOD CONDITION.
1 National Geodetic Survey, Retrieval Date = APRIL 11, 2011
GB0514 *****
GB0514 CBN - This is a Cooperative Base Network Control Station.
GB0514 DESIGNATION - Y 195
GB0514 PID - GB0514
GB0514 STATE/COUNTY- TN/ANDERSON
GB0514 USGS QUAD - WINDROCK (1975)
GB0514
GB0514 *CURRENT SURVEY CONTROL
GB0514
GB0514* NAD 83(2007)- 36 02 46.96326(N) 084 18 36.23225(W) ADJUSTED
GB0514* NAVD 88 - 249.717 (meters) 819.28 (feet) ADJUSTED
GB0514
GB0514 EPOCH DATE - 2002.00
GB0514 X - 511,900.268 (meters) COMP
GB0514 Y - -5,137,710.952 (meters) COMP
GB0514 Z - 3,732,482.975 (meters) COMP
GB0514 LAPLACE CORR- -4.82 (seconds) DEFLEC09
GB0514 ELLIP HEIGHT- 219.563 (meters) (02/10/07) ADJUSTED
GB0514 GEOID HEIGHT- -30.16 (meters) GEOID09
GB0514 DYNAMIC HT - 249.490 (meters) 818.54 (feet) COMP
GB0514
GB0514 ----- Accuracy Estimates (at 95% Confidence Level in cm) -----
GB0514 Type PID Designation North East Ellip
GB0514 -----
GB0514 NETWORK GB0514 Y 195 0.88 0.65 2.14
GB0514 -----
GB0514 MODELED GRAV- 979,717.6 (mgal) NAVD 88
GB0514
GB0514 VERT ORDER - FIRST CLASS I
GB0514
GB0514.The horizontal coordinates were established by GPS observations
GB0514.and adjusted by the National Geodetic Survey in February 2007.
GB0514
GB0514.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
GB0514.See National Readjustment for more information.
GB0514.The horizontal coordinates are valid at the epoch date displayed above.
GB0514.The epoch date for horizontal control is a decimal equivalence
GB0514.of Year/Month/Day.
GB0514
GB0514.The orthometric height was determined by differential leveling and
GB0514.adjusted in June 1991.
GB0514
GB0514.The X, Y, and Z were computed from the position and the ellipsoidal ht.
GB0514
GB0514.The Laplace correction was computed from DEFLEC09 derived deflections.
GB0514
GB0514.The ellipsoidal height was determined by GPS observations
GB0514.and is referenced to NAD 83.
GB0514
GB0514.The geoid height was determined by GEOID09.
GB0514
GB0514.The dynamic height is computed by dividing the NAVD 88
GB0514.geopotential number by the normal gravity value computed on the
GB0514.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
GB0514.degrees latitude (g = 980.6199 gals.).
GB0514
GB0514.The modeled gravity was interpolated from observed gravity values.
GB0514
GB0514; North East Units Scale Factor Converg.
GB0514;SPC TN - 191,376.028 752,267.166 MT 0.99995524 +0 59 21.7
GB0514;SPC TN - 627,872.85 2,468,063.19 sFT 0.99995524 +0 59 21.7
GB0514;UTM 16 - 3,992,441.213 742,323.063 MT 1.00032360 +1 35 01.1
GB0514
GB0514! - Elev Factor x Scale Factor = Combined Factor
GB0514!SPC TN - 0.99996554 x 0.99995524 = 0.99992078
GB0514!UTM 16 - 0.99996554 x 1.00032360 = 1.00028913
GB0514
GB0514 SUPERSEDED SURVEY CONTROL
GB0514
GB0514 NAD 83(1995)- 36 02 46.96322(N) 084 18 36.23217(W) AD( ) A
GB0514 ELLIP H (08/03/04) 219.559 (m) GP( ) 4 1
GB0514 NAVD 88 (02/01/05) 249.78 (m) 819.5 (f) LEVELING 3
GB0514 NAVD 88 (08/03/04) 249.72 (m) 819.3 (f) LEVELING 3
GB0514 NGVD 29 (??/??/92) 249.849 (m) 819.71 (f) ADJ UNCH 1 1
GB0514

```

GB0514.Superseded values are not recommended for survey control.  
 GB0514.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.  
 GB0514.[See file dsdata.txt](#) to determine how the superseded data were derived.  
 GB0514  
 GB0514\_U.S. NATIONAL GRID SPATIAL ADDRESS: 16SGE4232392441(NAD 83)  
 GB0514\_MARKER: DB = BENCH MARK DISK  
 GB0514\_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT  
 GB0514\_SP\_SET: SET IN TOP OF CONCRETE MONUMENT  
 GB0514\_STAMPING: Y 195 1950  
 GB0514\_MARK LOGO: CGS  
 GB0514\_MAGNETIC: N = NO MAGNETIC MATERIAL  
 GB0514\_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO  
 GB0514+STABILITY: SURFACE MOTION  
 GB0514\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR  
 GB0514+SATELLITE: SATELLITE OBSERVATIONS - January 24, 2011  
 GB0514  

HISTORY	Date	Condition	Report By
GB0514 HISTORY	- 1950	MONUMENTED	CGS
GB0514 HISTORY	- 1967	GOOD	NGS
GB0514 HISTORY	- 20031010	GOOD	TNDT
GB0514 HISTORY	- 20110124	GOOD	GEOCAC

## STATION DESCRIPTION

GB0514'DESCRIBED BY NATIONAL GEODETIC SURVEY 1967  
 GB0514'2 MI E FROM OLIVER SPRINGS.  
 GB0514'ABOUT 2.0 MILES EAST ALONG THE SOUTHERN RAILWAY FROM THE  
 GB0514'STATION AT OLIVER SPRINGS, ABOUT 0.4 MILE EAST OF MILEPOST 34,  
 GB0514'ABOUT 0.2 MILE EAST OF THE BRIDGE OVER POPLAR CREEK, 62 FEET  
 GB0514'SOUTHEAST OF THE CENTER OF A GRAVELED ROAD CROSSING THE MAIN  
 GB0514'TRACK, 51.7 FEET SOUTH OF THE SOUTH RAIL OF THE MAIN TRACK, 24  
 GB0514'FEET EAST OF THE CENTER LINE OF THE GRAVELED ROAD, 8 FEET EAST  
 GB0514'OF A FENCE CORNER, 2 1/2 FEET NORTH OF A FENCE, 1.1 FEET WEST  
 GB0514'OF A METAL WITNESS POST, ABOUT 4 FEET BELOW THE LEVEL OF THE  
 GB0514'TRACK AND SET IN THE TOP OF A CONCRETE POST PROJECTING 1 INCH  
 GB0514'ABOVE THE LEVEL OF THE GROUND.

## STATION RECOVERY (2003)

GB0514'RECOVERY NOTE BY TN DEPT OF TRANSP 2003  
 GB0514'RECOVERED AS DESCRIBED.

## STATION RECOVERY (2011)

GB0514'RECOVERY NOTE BY GEOCACHING 2011 (THD)  
 GB0514'RECOVERED IN GOOD CONDITION.

\*\*\* retrieval complete.  
 Elapsed Time = 00:00:05

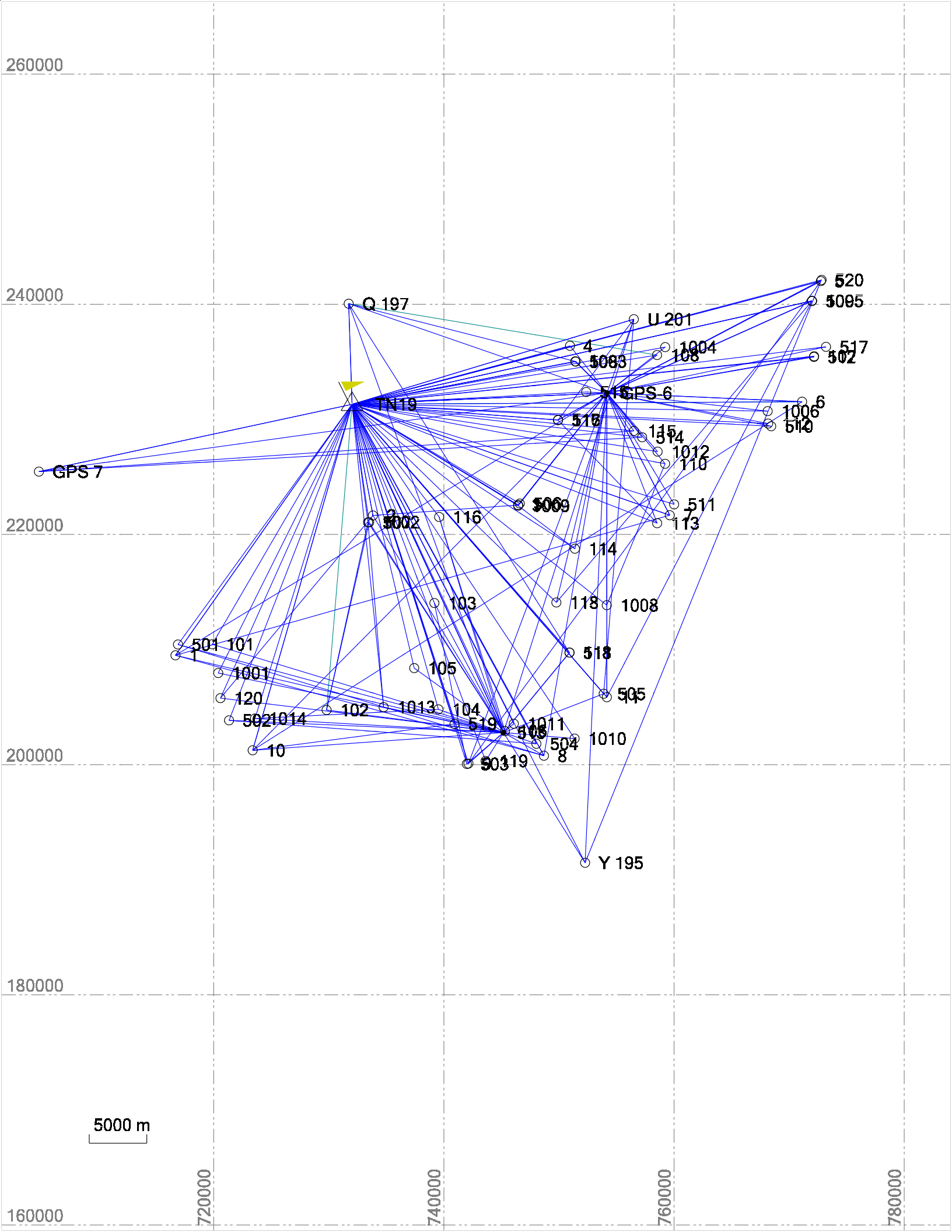


# SECTION 5



## SECTION 5: GPS CONTROL DIAGRAM

This section contains a map of the photogrammetric ground control stations and surrounding area for the USGS-OSMRE Tennessee LiDAR project.





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