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GPS Survey for LiDAR Report

Racine County 2013 Elevation Mapping Project

Prepared For:

STARR
(Strategic Alliance for Risk Reduction)
5565 Centerview Dr., Suite 107
Raleigh, NC 27606
P: 919.851.1919

Prepared By:

Quantum Spatial
(Formerly Aero-Metric, Inc.)
4020 Technology Parkway
Sheboygan, WI 53083
P: 920.457.3631
F:920.457.0410

Quantum Spatial Project No: 1130103

Table of Contents

STARR

GPS Survey for LiDAR Report

Contact Information:

Questions regarding the technical aspects of this report should be addressed to:
Quantum Spatial
4020 Technology Parkway
Sheboygan, WI 53083

Attention: Chris Guy (LiDAR Manager)
FAX: 920-457-0410
Email: cguy@quantumspatial.com

1. Report Narrative

Quantum Spatial, Inc. established accurate LiDAR trajectory coordinates for the Racine County area flown at 1700 meters above mean terrain. The information allows photogrammetrists to position the LiDAR imagery with minimal ground control and maintain the standards published by the Federal Geographic Data Committee. In conjunction with the AirBorne Global Positioning and Inertial Measuring System (ABGPS/IMU), 223 ground control points (checkpoints) were established to validate the accuracy of the LiDAR data.

Airborne GPS/IMU surveys were completed on March 18, 2010 during the acquisition of the imagery. Ground control surveys were completed in two different time periods. The first survey was performed between March 30, 2010 and March 17, 2011. The second survey was performed between February 11th, 2013 and February 15th 2013.

General Outline

- GPS equipment utilized for project.
  - GPS measurements used Wild/Leica System 500 receivers to support the ground checkpoint surveys. The Wild/Leica System 500's are dual frequency, multi-channeled receivers.
  - GPS equipment used to facilitate the airborne GPS processing (i.e. that were incorporated into the ABGPS adjustment) included Trimble receivers as downloaded through the Wisconsin Department of Transportation Continuously Operating Reference Stations (WISCORS) web site.
  - The aircraft used two Applanix AV-510 (version VER5, s/n 2679 and s/n 2885) units to receive and track the L1 C/A-code, L1 and L2 carrier phase, and L2 P-code (or encrypted Y-code) of up to 12 GPS satellites and to record the inertial measurement unit data.

- Conditions Affecting Progress.
  - None.

2. Ground Control Station Descriptions

2.1 Horizontal and Vertical Control

March 30th, 2010 to March 17th, 2011 Survey

Base horizontal control for the first check point survey consisted of two NGS First Order stations: **CALEDONIA W GPS**, and **YORKVILLE E GPS**; one NGS Third Order station: **BEAUMONT**; and eleven SEWRPC Third Order, Class 1 section corner stations: **C2-4-22**, **C36-3-22**, **N5-4-19**, **N5-4-20**, **S25-3-21**, **S28-4-23**, **SE20-4-22**, **SE20-2-19**, **SE33-3-20**, **SE34-5-21**, and **W6-3-19**.

Horizontal control is referenced to the Wisconsin State Plane Coordinate System – South Zone, based on the North American Datum of 1927 (NAD27). Final coordinates are published in US Survey Feet.

Base vertical control for the first check point survey consisted of three NGS Second Order, Class 1 stations: **BEAUMONT**, **CALEDONIA W GPS**, and **YORKVILLE E GPS**; and eleven SEWRPC Second Order, Class 2 section corner stations: **C2-4-22**, **C36-3-22**, **N5-4-19**, **N5-4-20**, **S25-3-21**, **S28-4-23**, **SE20-4-22**, **SE20-2-19**, **SE33-3-20**, **SE34-5-21**, and **W6-3-19**. The NGS Geoid Model GEOID09 was applied to the derived ellipsoid heights (modified from NGVD29 elevations) that approximate the National Geodetic Vertical Datum of 1929.

Vertical control is based on the National Geodetic Vertical Datum of 1929 (NGVD29).

February 11th, 2013 to February 15th, 2013 Survey

Base horizontal control for the second check point survey consisted of two NGS First Order stations: **RAYMOND S GPS,** and **CALENDONIA W GPS**; one SEWRPC Third Order Station **DOT AC**; and nine SEWRPC Third Order, Class 1 section corner stations: **S8-4-21, SE23-3-21, SE23-4-21, SE3-4-20, SE36-4-20, SE9-4-20, SW13-4-22, SW4-4-21, and SW7-3-21**.

Horizontal control is referenced to the Wisconsin State Plane Coordinate System – South Zone, based on the North American Datum of 1927 (NAD27). Final coordinates are published in US Survey Feet.

Base vertical control for the second check point survey consisted of two NGS Second Order, Class I stations: **CALEDONIA W GPS,** and **RAYMOND S GPS;** seven SEWRPC Second Order, class 2 section corner station **S8-4-21**, **SE23-3-21, SE23-4-21, SE3-4-20, SE9-4-20, SW13-4-22,** and **SW4-4-21** . The NGS Geoid Model GEOID09 was applied to the derived ellipsoid heights

(modified from NGVD29 elevations) that approximate the National Geodetic Vertical Datum of 1929.

Final coordinates are transformed and projected to Universal Transverse Mercator (UTM) Zone 16N meters, based on the North American Datum of 1983 (NAD83), and the vertical datum used was North American Vertical Datum of 1988 (NAVD88) US Survey Feet.

Base horizontal and vertical control for the Airborne GPS surveys consisted of three WISCORS stations: **KEHA**, **SHAN**, and **SIWI**.

NGS recovery sheets are located in Section 2 of the Control Survey Report.

2.2 Ground Computations

GPS data was collected using a combination of *Rapid Static* and *RTK* (Real-Time Kinematic) methods using the above listed control stations as control stations. GPS measurement reduction was done in two stages. Initial computations were done with LEICA Geo Office (LGO), version 4.0. LGO permits the conversion of raw satellite data collected by the receivers to a meaningful coordinate difference between points (baseline solutions). Once the baseline solutions were determined, they were input into the GeoSurv-GeoLab2 series of programs (Geolab version 2.4d).

2.3 Airborne GPS/IMU Computations

Airborne GPS

The carrier phase ambiguity resolution on the fly, without initialization, process was used to determine the airborne positions. This solution achieved a sub-decimeter kinematic position without the operational constraint of static initialization as used in semi-kinematic or stop-and-go positioning.

The processing technique used by Applanix, Inc. for achieving the desired accuracy is Kinematic Ambiguity Resolution (KAR). KAR searches for ambiguities and uses a special method to evaluate the relative quality of each intersection (RMS). A quality indicator is used to evaluate the accuracy of the solution for each processing computation. In addition to the quality indicator, the software will compute separation plots between any two solutions, which will ultimately determine the acceptance of the airborne GPS post processing.

Inertial Data

The post-processing between the inertial measuring unit (IMU) and aiding sensor data (i.e. airborne GPS post processed data) computes an optimally blended navigation solution. A Kalman filter-based aided inertial navigation algorithm generates the optimally accurate (in the sense of least-square error) navigation solution that retains the best characteristics of the processed input data. An example of inertial/GPS sensor blending is the following: inertial data is smooth in the short-term. However, a free-inertial navigation solution has errors that grow without bound with time. A GPS navigation solution exhibits short-term noise but has errors that are bounded. This optimally blended navigation solution will retain the best features of both, i.e. the blended navigation solution has errors that are smooth and bounded.

The resultant processing generates the following data:

- Position: latitude, longitude, altitude with respect to a user selectable datum
- Velocity: north, east, and down components
- 3-axis attitude: roll, pitch, true heading
- Acceleration: x, y, z components
- Angular rates: x, y, z components

These procedures are utilized for both the airborne processing and the blending of inertial and GPS processing. The software maker is Applanix, Inc. Programs utilized are POSPac (Position and Orientation System post-processing PACkage), POSGPS (POS Global Positioning System), POSProc (POS post-PROCessing), and POSEO (POS Exterior Orientation), versions 4.4.

The airborne GPS and blending of inertial and GPS post-processing were completed in multiple steps.

1. A PCMCIA card reader transferred the collected aircraft raw GPS data to the main computer transferred the raw base station data. Data was saved under the project number and an airborne sub-directory. Inside the airborne sub-directory, four additional sub-directories were also created - EO, GPS, PROC, and RAW.

2. The aircraft raw data (IMU and GPS data combined) was run through a data extractor program. This separated the IMU and GPS data. In addition to the extracting of data, it provided the analyst the first statistics on the overall flight. The program was POSPac (POS post-processing PACkage).

3. The base station and aircraft data were converted to Applanix, PosGPS data format.

4. Executing POSGPS program to derive accurate GPS positions for all flights:

The software utilized for the data collected was PosGPS, a kinematic on-the-fly (OTF) processing software package. Post processing of the data is computed from each base station in both a forward and backward direction. This provides the analyst the ability to Quality Check (QC) the post processing, since different ambiguities are determined from different base stations and also with the same data from different directions.

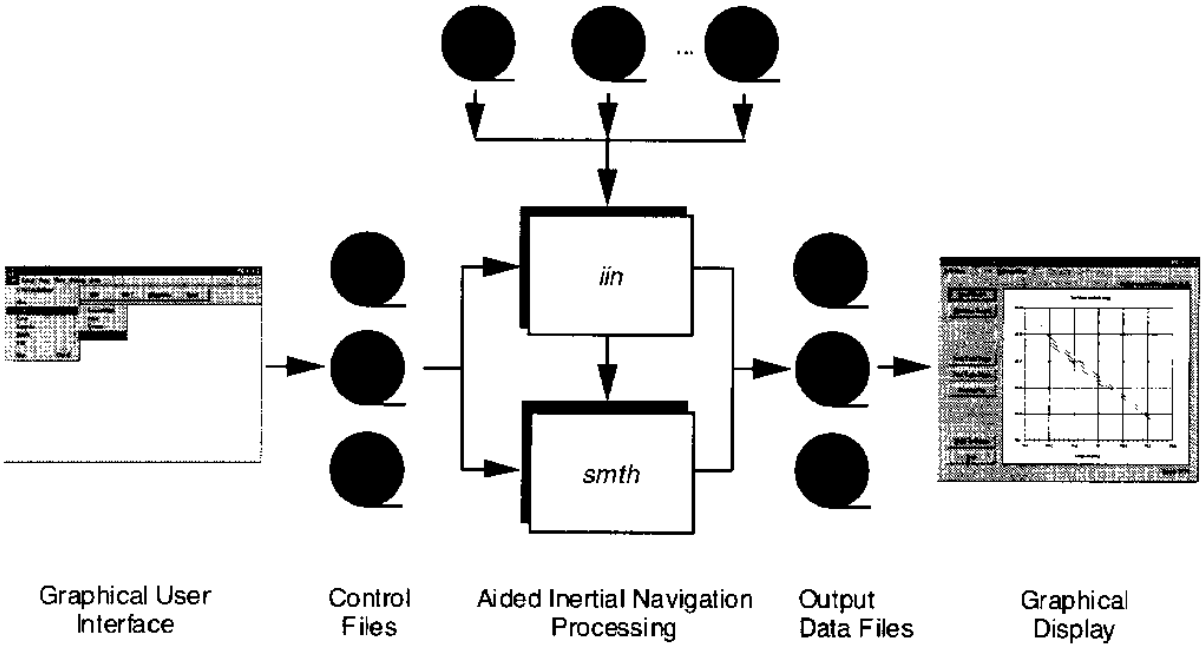
The trajectory separation program is designed to display the time of week that the airborne or roving antenna traveled, and compute the differences found between processing runs. Processed data can be compared between a forward/reverse solution from one base station, a reverse solution from one base station and a forward solution from the second base station, etc. This is ultimately the final QC check for the post-processing of the GPS data for the project. This checks the data – when two processing runs agree with each other. If wrong ambiguities were found with one or both runs, the analyst would see disagreements from the trajectory plot, and re-processing would continue until an agreement was determined.

Once the analyst accepts a forward and reverse processing solution, the trajectory plot is printed and the combined solution is stored in a file format acceptable for the IMU post processor. See Section 4 of the control report for the trajectory plot of the accepted processing solutions.

5. When the data was accepted after quality control analysis, the separation plot is printed and the combined solution is stored in a file format acceptable for the IMU post processor (i.e. POSProc).

6. Execute POSProc.

Diagram 3



POSProc comprises a set of individual processing interface tools that execute and provide the following functions:

Diagram 3 shows the organization of these tools, and is a function of the POSProc processing components.

Integrated Inertial Navigation (*iin*) Module

The name *iin* is a contraction of Integrated Inertial Navigation. *iin* reads inertial data and aiding data from data files specified in a processing environment file and computes the aided inertial navigation solution. The inertial data comes from a strapdown IMU. *iin* outputs the navigation data between start and end times at a data rate as specified in the environment file. *iin* also outputs Kalman filter data for analysis of estimation error statistics and smoother data that the smoothing program *smth* uses to improve the navigation solution accuracy.

iin implements a full strapdown inertial navigator that solves Newton's equation of motion on the earth using inertial data from a strapdown IMU. The inertial navigator

implements coning and sculling compensation to handle potential problems caused by vibration of the IMU.

Smoother Module (*smth*)

smth is a companion processing module to *iin*. *smth* is comprised of two individual functions that run in sequence. *smth* first runs the *smoother function* and then runs the *navigation correction function*.

The *smth* smoother function performs backwards-in-time processing of the forwards-in-time blended navigation solution and Kalman filter data generated by *iin* to compute smoothed error estimates. *smth* implements a modified Bryson-Frazier smoothing algorithm specifically designed for use with the *iin* Kalman filter. The resulting smoothed strapdown navigator error estimates at a given time point are the optimal estimates based on all input data before and after the given time point. In this sense, *smth* makes use of all available information in the input data. *smth* writes the smoothed error estimates and their RMS estimation errors to output data files.

The *smth* navigation correction function implements a feedforward error correction mechanism similar to that in the *iin* strapdown navigation solution using the smoothed strapdown navigation errors. s*mth* reads in the smoothed error estimates and with these, corrects the strapdown navigation data. The resulting navigation solution is called a Best Estimate of Trajectory (BET), and is the best obtainable estimate of vehicle trajectory with the available inertial and aiding sensor data.

The above-mentioned modules provide the analyst the following statistics to ensure that the most optimal solution was achieved: a log of the *iin* processing, the Kalman filter Measurement Residuals, Smoothed RMS Estimation Errors, and Smoothed Sensor Errors and RMS.

The Best Estimate of Trajectory output file is the final product of the airborne GPS/IMU processing and is used as input into the LiDAR point cloud processing.

2.4 LiDAR Statistics

Statistics pertaining to the analysis and accuracy of the LiDAR points are as follows:

1. 1700 meters above mean terrain was the flying height.
2. 2 foot nominal ground point spacing as tested.
3. Side to side scan width was a nominal 44 degrees
4. 223 total checkpoints spread throughout the area were used to validate the LiDAR elevation.
5. Checkpoints were divided into 5 classes of surfaces.
6. The vertical Root Mean Square (RMS) error found from the 5 surface classes:
    - Hard surface = 0.50 feet
    - Short grass = 0.44 feet
    - Long grass = 0.49 feet
    - Brush = 0.47 feet
    - Forest = 0.51 feet

3. Final Ground Coordinate List

1130103 RACINE CO *** GROUND SURVEY FILE ***
HORIZONTAL - NAD 83 UTM ZONE 16, METERS
VERTICAL - NAVD88 US SURVEY FOOT

STATION	EASTING	NORTHING	ELEVATION
1	425286.843	4742189.113	680.130
2	424508.961	4739830.542	721.826
3	422390.691	4739934.616	774.802
4	419727.115	4742394.355	770.317
5	417514.281	4742419.939	752.105
6	415690.075	4742495.951	765.953
7	412755.464	4740832.019	816.032
8	414818.579	4740187.817	820.937
9	417668.050	4739185.209	744.775
10	420463.005	4739146.106	745.497
11	417943.420	4735943.998	735.596
12	415250.840	4734322.754	755.491
13	415862.421	4732361.665	746.623
14	421441.966	4734024.836	750.579
15	420578.428	4735919.398	710.067
16	415612.362	4737629.046	778.161
17	410768.026	4736854.997	794.293
18	410685.896	4733518.727	797.190
19	407451.430	4729938.246	799.034
20	409032.229	4726808.932	822.262
21	411420.277	4724884.544	837.131
22	413814.264	4725759.361	776.839
23	413826.395	4728256.137	791.019
24	412265.028	4730407.486	820.760
25	415497.956	4731096.644	742.630
26	417645.405	4727811.796	740.123
27	417842.372	4725259.564	785.970
28	419785.269	4727239.948	799.825
29	420290.542	4729508.537	767.489
30	422255.746	4730466.984	769.195
31	425229.297	4730033.838	745.261
32	425137.653	4726109.505	735.543
33	421981.413	4725556.923	735.527
34	427511.660	4726849.162	691.797
35	429859.101	4725959.532	727.236
36	430349.644	4727620.882	712.020
37	430867.453	4731360.763	714.218
38	426261.457	4731429.515	741.662
39	413333.924	4742599.574	814.884
40	411714.427	4742449.210	826.888
41	408895.260	4743151.961	779.457
43	407664.920	4741383.221	768.634

44	408349.308	4739271.460	775.920
45	405970.838	4738463.417	782.167
46	403640.412	4738468.825	802.272
47	404181.630	4735848.599	807.101
48	406558.622	4735085.977	787.738
49	407932.379	4737672.976	778.483
50	409106.777	4736048.705	794.391
51	409057.506	4732781.316	800.038
52	405442.821	4733618.840	852.383
53	406266.447	4732845.589	804.864
54	405840.328	4730628.642	832.075
55	404794.245	4731114.243	799.998
56	406200.415	4727935.683	804.670
57	407424.724	4726213.276	803.460
58	409008.678	4724700.144	830.274
59	411212.474	4727899.573	836.816
60	409594.112	4729551.570	809.362
61	413438.043	4732706.453	775.087
62	412332.978	4735150.907	806.967
63	411253.249	4738831.229	772.062
64	413465.581	4738028.479	822.006
65	419519.398	4732648.036	752.351
66	417492.298	4730119.427	713.680
67	422237.070	4742104.028	716.856
68	425156.127	4737429.328	714.001
69	423589.641	4737464.406	762.856
70	423536.377	4735375.341	745.235
72	423247.001	4733274.816	765.720
73	424534.315	4732392.080	733.660
74	426111.564	4734203.239	724.205
75	429162.445	4734661.557	688.253
76	431664.018	4740336.350	690.218
77	429308.135	4742116.847	681.314
78	428300.798	4740546.815	686.797
79	437866.263	4736829.034	593.129
80	434261.175	4735606.072	643.519
81	410702.724	4734424.563	782.193
82	410496.167	4740859.869	774.874
83	410488.749	4740880.579	777.915
84	410652.984	4743985.574	794.752
85	411457.544	4742475.884	817.229
86	408191.524	4729286.862	806.950
87	407879.918	4727592.262	799.214
88	405813.374	4725796.292	804.273
89	404193.445	4724995.438	804.309
90	404211.167	4725441.169	813.128
91	403392.076	4727976.703	801.075

92	403251.197	4729584.907	801.993
93	404054.758	4729584.440	789.385
94	408475.244	4731163.984	800.635
95	403240.497	4732870.533	826.252
96	403112.203	4737778.605	811.865
97	404127.847	4739721.646	834.306
98	405642.094	4740850.446	772.154
99	405465.330	4742527.781	795.438
100	403735.598	4742531.584	786.022
101	403280.627	4744044.772	808.381
101A	395730.609	4718997.119	829.936
102	395077.956	4729620.595	769.670
103	396443.489	4742938.709	842.268
104	401908.870	4739105.177	810.284
105	400568.249	4737100.150	781.862
106	411009.931	4738878.925	780.750
107	413873.803	4740845.127	833.096
108	429820.017	4737273.962	695.743
109	430746.171	4735278.054	709.276
110	430513.263	4733379.130	744.037
111	435618.226	4731139.025	594.254
112	428376.601	4732274.112	685.812
113	427988.031	4728423.203	680.051
114	419872.919	4727262.309	795.895
115	415360.415	4726326.147	746.525
116	421513.209	4727320.376	758.378
117	423486.376	4729761.657	741.786
118	425236.239	4737386.216	717.839
119	425244.414	4741866.573	685.484
120	422517.397	4739875.749	794.227
121	396228.146	4735678.884	871.235
122	394347.379	4739713.069	807.367
123	395136.625	4738303.143	821.773
124	398023.037	4733118.370	807.715
125	400840.706	4724376.149	769.103
201	395733.072	4718997.927	829.853
202	397618.691	4723944.605	755.658
203	397441.675	4743335.660	794.880
204	402025.781	4741132.464	818.325
205	399561.196	4738520.214	865.700
206	410821.416	4739273.788	771.616
207	411304.458	4741744.242	806.442
208	429966.730	4737006.351	712.902
209	430787.877	4735599.173	694.624
210	434058.250	4731999.820	644.832
211	433242.630	4729904.880	642.853
212	427382.158	4731852.605	692.410

213	428749.175	4729378.014	676.416
214	419898.162	4727305.940	796.232
215	415919.708	4727858.838	740.176
216	415885.980	4727859.833	743.214
217	425152.478	4737417.363	714.398
218	425271.809	4741842.601	684.221
219	422403.155	4739934.889	775.645
220	421011.683	4739926.971	787.921
221	396290.974	4737384.660	820.490
222	395566.964	4740708.001	814.450
223	393833.484	4736474.832	848.266
224	399789.127	4732357.455	775.494
225	402248.788	4729923.960	781.820
301	397615.777	4723946.407	755.612
302	395075.625	4729619.438	769.897
303	397443.232	4743333.780	795.458
304	402023.342	4741132.105	818.545
305	411009.942	4738881.395	780.819
306	411305.639	4741743.806	806.340
307	429814.979	4736852.953	701.504
308	430791.019	4735912.543	698.040
309	431601.111	4738787.842	686.337
310	429397.549	4732007.808	703.723
311	429776.700	4727950.729	697.741
312	419961.572	4727348.791	793.657
313	419922.827	4727351.074	791.853
314	415451.076	4726331.232	739.241
315	415935.019	4727856.819	739.271
316	418873.277	4727841.128	751.124
317	421564.831	4727385.750	759.726
318	425138.624	4737388.426	718.053
319	425276.430	4741895.367	682.859
320	422452.279	4739945.707	784.962
321	396293.415	4737386.058	820.228
322	393834.538	4736475.750	848.138
323	399787.130	4732358.842	775.908
401	395068.540	4721106.985	796.307
402	395005.399	4727650.069	767.414
403	393028.461	4733690.201	814.181
404	396442.711	4742941.520	842.223
405	400569.316	4737102.059	781.485
406	399560.763	4738520.118	865.618
407	408993.671	4733566.134	797.243
408	430397.890	4736983.953	686.885
409	430653.147	4738835.519	731.012
410	429797.685	4729041.530	714.494
411	419911.005	4727334.568	795.206

412	419894.803	4727313.531	796.944
413	415430.866	4726323.033	741.692
414	421079.167	4726187.556	763.765
415	416008.820	4727847.393	736.285
416	418867.212	4727839.727	750.360
417	422076.625	4730443.685	772.138
418	425119.218	4737389.375	719.401
419	425245.511	4741690.271	700.727
420	422441.259	4739880.081	790.149
421	396229.476	4735678.655	870.877
422	394347.080	4739713.863	808.213
423	395115.016	4738282.989	824.660
424	401430.252	4726538.705	821.068
425	399797.935	4722464.321	757.341
501	395071.434	4721104.686	795.966
502	393028.337	4733692.603	814.099
503	399282.175	4742179.461	776.107
504	401910.026	4739104.185	810.104
505	396799.157	4736828.252	829.955
506	411008.864	4738876.992	780.652
507	429496.728	4737120.126	668.519
508	430354.994	4735268.869	720.005
509	431625.765	4738647.470	682.095
510	432803.819	4733239.075	645.202
511	433892.609	4732901.778	655.845
512	434626.932	4731327.079	630.586
513	436687.440	4731340.742	586.538
514	427758.570	4731177.115	696.131
515	429194.158	4730531.640	692.263
516	427294.012	4728001.542	683.175
517	415441.328	4726316.171	742.466
518	423486.650	4729730.648	741.199
519	425176.249	4737396.494	719.381
520	421046.203	4739939.023	791.721
521	394347.453	4739712.462	808.597
522	395564.938	4740708.908	814.680
523	395138.159	4738301.900	821.976
524	402249.403	4729925.334	781.951
525	401428.977	4726538.855	821.347
526	400986.601	4719352.667	772.532
1K78	409040.061	4726748.959	818.453
BEAUMONT	409303.268	4732782.969	803.063
C2-4-22	429324.346	4742923.582	690.642
C36-3-22	430712.362	4725113.112	683.696
CC	408993.838	4724700.410	830.103
DONIAWGPS	425194.313	4737737.553	719.998
DOT_AC	412286.889	4734420.517	802.843

CALEDONIA_W_GPS	425249.401	4742182.984	680.133
CALEDONIA_GPS	425194.264	4737737.571	719.959
RAYMOND_S_GPS	419477.525	4734367.158	712.663
UNION_GROVE_GPS	412997.777	4726582.909	801.426
VILLEEGPS	419949.552	4727342.869	793.739
YORKVILLE_E_GPS	419949.604	4727342.847	793.935
S8_4_21	414827.096	4740848.798	817.200
S25-3-21	421080.744	4726199.522	764.201
S28-4-23	435620.161	4735573.832	624.129
SE20-4-22	425176.115	4737396.148	719.418
SE20-2-19	396116.980	4718402.404	855.995
SE23_3_21	420286.701	4727823.818	789.818
SE23_4_21	420418.751	4737527.646	717.446
SE3_4_20	409301.756	4742490.127	776.905
SE34-5-21	419001.768	4743923.699	749.749
SE36_4_20	412298.688	4734402.497	803.771
SE9_4_20	407637.970	4740878.309	774.329
SIWI	419710.770	4746616.913	739.890
SW13_4_22	430044.251	4738870.172	697.449
SW4_4_21	415678.708	4742482.060	768.696
SW7_3_21	412282.416	4731132.367	808.128
W6-3-19	392969.988	4733696.154	809.758

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
DATABASE =  ,PROGRAM = datasheet, VERSION = 7.87
1        National Geodetic Survey,   Retrieval Date = JUNE  3, 2011
 NH0982 ***********************************************************************
 NH0982  DESIGNATION -  BEAUMONT
 NH0982  PID         -  NH0982
 NH0982  STATE/COUNTY-  WI/RACINE
 NH0982  USGS QUAD   -  UNION GROVE (1971)
 NH0982
 NH0982                         *CURRENT SURVEY CONTROL
 NH0982  ______________________________________________________________________
 NH0982* NAD 83(1991)-  42 44 31.93665(N)    088 06 29.17149(W)      ADJUSTED
 NH0982* NAVD 88     -       245.     (meters)     804.     (feet)   SCALED
 NH0982  ______________________________________________________________________
 NH0982  LAPLACE CORR-          -2.00  (seconds)                      DEFLEC09
 NH0982  GEOID HEIGHT-         -34.54  (meters)                       GEOID09
 NH0982  HORZ ORDER  -  THIRD
 NH0982
 NH0982.The horizontal coordinates were established by classical geodetic methods
 NH0982.and adjusted by the National Geodetic Survey in November 1991.
 NH0982
 NH0982.The orthometric height was scaled from a topographic map.
 NH0982
 NH0982.The Laplace correction was computed from DEFLEC09 derived deflections.
 NH0982
 NH0982.The geoid height was determined by GEOID09.
 NH0982
 NH0982;                    North         East     Units Scale Factor Converg.
 NH0982;SPC WI S     -    84,209.894   754,896.899   MT  0.99999822   +1 17 59.7
 NH0982;SPC WI S     -   276,278.63  2,476,690.91   sFT  0.99999822   +1 17 59.7
 NH0982;UTM  16      - 4,732,782.992   409,303.204   MT  0.99970120   -0 45 07.6
 NH0982
 NH0982!             -  Elev Factor  x  Scale Factor =   Combined Factor
 NH0982!SPC WI S     -   0.99996701  x   0.99999822  =   0.99996523
 NH0982!UTM  16      -   0.99996701  x   0.99970120  =   0.99966822
 NH0982
 NH0982:                Primary Azimuth Mark                    Grid Az
 NH0982:SPC WI S     -  BEAUMONT AZ MK                         218 11 54.8
 NH0982:UTM  16      -  BEAUMONT AZ MK                         220 15 02.1
 NH0982
 NH0982|-----------------------------------------------------------------------|
 NH0982| PID    Reference Object                    Distance      Geod. Az   |
 NH0982|                                                          dddmmss.s  |
 NH0982| CJ7905 CALEDONIA PP 2                      75.895 METERS 11728      |
 NH0982| NH0979 UNION GROVE SO WIS COLONY TANK     APPROX. 5.6 KM 1602207.8  |
 NH0982| CI8994 BEAUMONT RM 1                       20.925 METERS 19127      |
 NH0982| CI8993 BEAUMONT AZ MK                                    2192954.5  |
 NH0982| CI8995 BEAUMONT RM 2                       25.976 METERS 25910      |
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NH0982| CJ7904 CALEDONIA PP 1                          60.655 METERS 30518     |
NH0982| NH0965 NORWAY MUSKEGO EVAN LUTH CH          APPROX. 8.5 KM 3224316.8 |
NH0982|-----------------------------------------------------------------------|
NH0982
NH0982                          SUPERSEDED SURVEY CONTROL
NH0982
NH0982  NAD 83(1986)-  42 44 31.92835(N)    088 06 29.18258(W) AD(       ) 3
NH0982  NAD 27      -  42 44 31.86380(N)    088 06 28.87170(W) AD(       ) 3
NH0982
NH0982.Superseded values are not recommended for survey control.
NH0982.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
NH0982.See file dsdata.txt to determine how the superseded data were derived.
NH0982
NH0982_U.S. NATIONAL GRID SPATIAL ADDRESS: 16TDN0930332782(NAD 83)
NH0982_MARKER: DS = TRIANGULATION STATION DISK
NH0982_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
NH0982_SP_SET: TOP OF SQUARE CONCRETE MONUMENT
NH0982_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
NH0982+SATELLITE: SATELLITE OBSERVATIONS - March 22, 2009
NH0982
NH0982  HISTORY     - Date     Condition        Report By
NH0982  HISTORY     - 1957     MONUMENTED       CGS
NH0982  HISTORY     - 1973     GOOD             LOCENG
NH0982  HISTORY     - 20090322 GOOD             INDIV
NH0982
NH0982                          STATION DESCRIPTION
NH0982
NH0982'DESCRIBED BY COAST AND GEODETIC SURVEY 1957 (WNM)
NH0982'THE STATION IS LOCATED ABOUT 6 MILES EAST-SOUTHEAST OF WATERFORD,
NH0982'0.15 MILE EAST OF BEAUMONT, ON THE NORTH SIDE OF STATE HIGHWAY
NH0982'20, ON PROPERTY OWNED AND OCCUPIED BY MRS. MAUD LEGGERT.  IT
NH0982'IS 45.5 FEET NORTH OF THE CENTERLINE OF HIGHWAY 20, 11 FEET
NH0982'NORTH OF AN EAST-WEST FENCE, 26.5 FEET WEST OF A NORTH-SOUTH
NH0982'FENCE AND 11.5 FEET NORTH OF A WHITE WITNESS POST.  THE MONUMENT
NH0982'IS 14 INCHES BELOW THE GROUND SURFACE AND THE DISK IS STAMPED
NH0982'BEAUMONT 1957.
NH0982'
NH0982'TO REACH THE STATION FROM THE JUNCTION OF STATE HIGHWAY 20
NH0982'AND STATE HIGHWAY 75 IN BEAUMONT, GO EAST ON HIGHWAY 20
NH0982'FOR 0.15 MILE TO THE STATION ON THE LEFT.  TO REACH THE
NH0982'AZIMUTH MARK FROM THE STATION, GO WEST TO THE JUNCTION OF
NH0982'STATE HIGHWAYS 20 AND 75.  TURN LEFT, SOUTH, AND GO 0.15
NH0982'MILE TO THE AZIMUTH MARK ON THE LEFT.
NH0982'
NH0982'REFERENCE MARK 1 IS 22.3 FEET SOUTH OF THE CENTERLINE OF
NH0982'STATE HIGHWAY 20, 1 FOOT NORTH OF AN EAST-WEST FENCE AND 5.8
NH0982'FEET WEST OF A POWER LINE POLE.  THE MONUMENT IS FLUSH AND
NH0982'THE DISK IS STAMPED BEAUMONT 1957.
NH0982'
NH0982'REFERENCE MARK 2 IS 31 FEET NORTH OF THE CENTERLINE OF STATE
NH0982'HIGHWAY 20, 1 FOOT NORTH OF AN EAST-WEST FENCE, 13 FEET
NH0982'NORTHWEST OF A TELEPHONE LINE POLE AND 127.7 FEET EAST OF A
NH0982'FENCE CORNER.  THE MONUMENT IS FLUSH AND THE DISK IS STAMPED
NH0982'BEAUMONT 1957.
NH0982'
NH0982'THE AZIMUTH MARK IS 27.5 FEET EAST OF THE CENTERLINE OF STATE
NH0982'HIGHWAY 75, 19 FEET NORTH OF THE NORTH EDGE OF A WIRE GATE, 2
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NH0982'FEET SOUTHWEST OF A WHITE WITNESS POST AND 1 FOOT WEST OF A
NH0982'WIRE FENCE. THE MONUMENT IS FLUSH AND THE DISK IS STAMPED
NH0982'BEAUMONT 1957.
NH0982'
NH0982'HEIGHT OF LIGHT ABOVE STATION MARK 18 METERS.
NH0982
NH0982 STATION RECOVERY (1973)
NH0982
NH0982'RECOVERY NOTE BY LOCAL ENGINEER (INDIVIDUAL OR FIRM) 1973 (GME)
NH0982'RECOVERED BY NIELSEN MADSEN CONSULTING ENG.
NH0982'
NH0982'BEAUMONT 1957-GOOD 14 IN BELOW SURFACE
NH0982'
NH0982'R.M. 1-GOOD FLUSH
NH0982'
NH0982'R.M. 2-GOOD 6 IN BELOW SURFACE.
NH0982'
NH0982'AZ MK GOOD FLUSH
NH0982
NH0982 STATION RECOVERY (2009)
NH0982
NH0982'RECOVERY NOTE BY INDIVIDUAL CONTRIBUTORS 2009
NH0982'WITNESS POST HAS BEEN MOVED. IT IS NOW 2' SOUTH OF STATION. ALL FENCES
NH0982'ARE GONE. STATION IS 9' SOUTH OF FIELD EDGE. STATION IS 50' NORTH OF
NH0982'CENTERLINE OF ROAD OF EAST-WEST ROAD.

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

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.00
1        National Geodetic Survey,   Retrieval Date = FEBRUARY 25, 2013
 DF9497 ***********************************************************************
 DF9497  DESIGNATION -  CALEDONIA GPS
 DF9497  PID         -  DF9497
 DF9497  STATE/COUNTY-  WI/RACINE
 DF9497  COUNTRY     -  US
 DF9497  USGS QUAD   -  FRANKSVILLE (1994)
 DF9497
 DF9497                         *CURRENT SURVEY CONTROL
 DF9497 ______________________________________________________________________
 DF9497* NAD 83(2011) POSITION- 42 49 42.83041(N) 087 54 52.37917(W)    ADJUSTED
 DF9497* NAD 83(2011) ELLIP HT-   172.467 (meters)        (06/27/12)    ADJUSTED
 DF9497* NAD 83(2011) EPOCH    -  2010.00
 DF9497* NAVD 88 ORTHO HEIGHT -   207.305  (meters)     680.13   (feet) ADJUSTED
 DF9497 ______________________________________________________________________
 DF9497  NAD 83(2011) X  -    170,488.586 (meters)                      COMP
 DF9497  NAD 83(2011) Y  - -4,681,944.540 (meters)                      COMP
 DF9497  NAD 83(2011) Z  -  4,313,670.956 (meters)                      COMP
 DF9497  LAPLACE CORR    -         -1.82  (seconds)                     DEFLEC12A
 DF9497  GEOID HEIGHT    -        -34.84  (meters)                      GEOID12A
 DF9497  DYNAMIC HEIGHT  -        207.247 (meters)      679.94   (feet) COMP
 DF9497  MODELED GRAVITY -    980,334.3   (mgal)                        NAVD 88
 DF9497
 DF9497  VERT ORDER      -  SECOND    CLASS I
 DF9497
 DF9497  FGDC Geospatial Positioning Accuracy Standards (95% confidence, cm)
 DF9497  Type                                          Horiz  Ellip  Dist(km)
 DF9497  ----------------------------------------------------------------------
 DF9497  NETWORK                                        0.29   0.37
 DF9497  ----------------------------------------------------------------------
 DF9497  MEDIAN LOCAL ACCURACY AND DIST (022 points)   0.32   0.39     16.73
 DF9497  ----------------------------------------------------------------------
 DF9497  NOTE: Click here for information on individual local accuracy
 DF9497  values and other accuracy information.
 DF9497
 DF9497
 DF9497.The horizontal coordinates were established by GPS observations
 DF9497.and adjusted by the National Geodetic Survey in June 2012.
 DF9497
 DF9497.NAD 83(2011) refers to NAD 83 coordinates where the reference
 DF9497.frame has been affixed to the stable North American tectonic plate. See
 DF9497.NA2011 for more information. for more information.
 DF9497
 DF9497.The horizontal coordinates are valid at the epoch date displayed above
 DF9497.which is a decimal equivalence of Year/Month/Day.
 DF9497
 DF9497.The orthometric height was determined by differential leveling and
 DF9497.adjusted by the WI DEPT OF TRANSP
 DF9497.in May 2012.
 DF9497
 DF9497.Photographs are available for this station.
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DF9497
DF9497.The X, Y, and Z were computed from the position and the ellipsoidal ht.
DF9497
DF9497.The Laplace correction was computed from DEFLEC12A derived deflections.
DF9497
DF9497.The ellipsoidal height was determined by GPS observations
DF9497.and is referenced to NAD 83.
DF9497
DF9497.The dynamic height is computed by dividing the NAVD 88
DF9497.geopotential number by the normal gravity value computed on the
DF9497.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
DF9497.degrees latitude (g = 980.6199 gals.).
DF9497
DF9497.The modeled gravity was interpolated from observed gravity values.
DF9497
DF9497. The following values were computed from the NAD 83(2011) position.
DF9497

		North	East	Units	Scale Factor	Converg.
DF9497;SPC WI S	-	94,178.261	770,500.815	MT	0.99998216	+1 25 58.5
DF9497;SPC WI S	-	308,983.18	2,527,884.76	sFT	0.99998216	+1 25 58.5
DF9497;UTM 16	-	4,742,182.984	425,249.402	MT	0.99966874	-0 37 18.3

		Elev Factor	x	Scale Factor	=	Combined Factor
DF9497!SPC WI S	-	0.99997295	x	0.99998216	=	0.99995511
DF9497!UTM 16	-	0.99997295	x	0.99966874	=	0.99964170

DF9497
DF9497 SUPERSEDED SURVEY CONTROL
DF9497

DF9497	NAD 83(2007)-	42 49 42.83042(N)	087 54 52.37997(W)		AD( )	0	
DF9497	ELLIP H (02/10/07)	172.498 (m)			GP( )		
DF9497	NAD 83(1997)-	42 49 42.83049(N)	087 54 52.38009(W)		AD( )	B	
DF9497	ELLIP H (04/02/04)	172.504 (m)			GP( )	3	1
DF9497	NAVD 88 (07/26/07)	207.28 (m)	680.1	(f)	LEVELING	3	
DF9497	NAVD 88 (04/20/07)	207.283 (m)	680.06	(f)	SUPERSEDED	2	1
DF9497	NAVD 88 (04/02/04)	207.31 (m)	680.1	(f)	LEVELING	3	
DF9497	NAVD 88 (02/25/04)	207.305 (m)	680.13	(f)	SUPERSEDED	2	1

DF9497
DF9497.Superseded values are not recommended for survey control.
DF9497
DF9497.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
DF9497.See file dsdata.txt to determine how the superseded data were derived.
DF9497
DF9497_U.S. NATIONAL GRID SPATIAL ADDRESS: 16TDN2524942182(NAD 83)
DF9497
DF9497_MARKER: DD = SURVEY DISK
DF9497_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
DF9497_STAMPING: CALEDONIA GPS 2002
DF9497_MARK LOGO: WIDT
DF9497_PROJECTION: FLUSH
DF9497_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
DF9497_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
DF9497_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
DF9497+SATELLITE: SATELLITE OBSERVATIONS - June 12, 2008
DF9497

DF9497	HISTORY	- Date	Condition	Report By
DF9497	HISTORY	- 2001	MONUMENTED	WIDT
DF9497	HISTORY	- 20080612	GOOD	WIDT

DF9497
DF9497 STATION DESCRIPTION
DF9497
DF9497'DESCRIBED BY WI DEPT OF TRANSP 2001 (DJH)

DF9497'THE STATION IS LOCATED ABOUT 24 KM SOUTH OF MILWAUKEE, 15 KM
DF9497'NORTHWEST OF RACINE AND 12 KM SOUTHEAST OF FRANKLIN.
DF9497'OWNERSHIP--WISCONSIN DEPARTMENT OF TRANSPORTATION. TO REACH THE
DF9497'STATION FROM THE JUNCTION OF STATE HIGHWAY 31 WITH STATE HIGHWAY 32
DF9497'ABOUT 15 KM NORTHWEST OF RACINE, GO SOUTH ON STATE HIGHWAY 31 FOR 0.2
DF9497'KM TO COUNTY HIGHWAY G, TURN RIGHT AND GO WEST ON COUNTY HIGHWAY G
DF9497'FOR 3.3 KM TO STATE HIGHWAY 38, CONTINUE WEST ON STATE HIGHWAY 38 FOR
DF9497'3.1 KM TO COUNTY HIGHWAY H ON THE LEFT, TURN RIGHT AND GO NORTH ON
DF9497'STATE HIGHWAY 38 FOR 1.0 KM TO FOREST HILLS ROAD ON THE RIGHT,
DF9497'CONTINUE NORTH ON STATE HIGHWAY 38 FOR 0.4 KM TO THE STATION ON THE
DF9497'LEFT. THE STATION IS A BRONZE WISCONSIN DEPARTMENT OF TRANSPORTATION
DF9497'GEODETIC SURVEY CONTROL STATION DISK SET IN THE TOP OF A 41-CM
DF9497'DIAMETER CONCRETE POST SET TO A DEPTH OF 2.1 M AND ABOUT LEVEL WITH
DF9497'THE HIGHWAY PAVEMENT. THE STATION IS 18.0 M WEST OF THE CENTERLINE
DF9497'OF STATE HIGHWAY 38, 51.4 M SOUTH OF THE CENTERLINE OF 7 MILE ROAD,
DF9497'AND 28 M NORTH OF THE EXTENDED CENTERLINE OF PRIVATE ENTRANCE --7921
DF9497'STATE HIGHWAY 38--. ---NOTE---THE STATION IS EAST, WEST AND NORTH OF
DF9497'THREE ORANGE 4X4 PLASTIC WITNESS POSTS. ---NOTE2---THIS STATION HAS
DF9497'NO VISIBLE OBSTRUCTIONS EXTENDING HIGHER THAN 20 DEGREES ABOVE THE
DF9497'HORIZON.
DF9497
DF9497 STATION RECOVERY (2008)
DF9497
DF9497'RECOVERY NOTE BY WI DEPT OF TRANSP 2008 (MAB)
DF9497'RECOVERED IN GOOD CONDITION. REPLACED TWO BROKEN GUARD POSTS. THE
DF9497'STATION IS 1.0 M NORTH, 1.0 M EAST, AND 1.0 M WEST OF THREE 4X4 ORANGE
DF9497'PLASTIC GUARD POSTS.

*** retrieval complete.
Elapsed Time = 00:00:06

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.00
1        National Geodetic Survey,   Retrieval Date = FEBRUARY 25, 2013
 DF9498 ***********************************************************************
 DF9498  DESIGNATION -  CALEDONIA W GPS
 DF9498  PID         -  DF9498
 DF9498  STATE/COUNTY-  WI/RACINE
 DF9498  COUNTRY     -  US
 DF9498  USGS QUAD   -  FRANKSVILLE (1994)
 DF9498
 DF9498                         *CURRENT SURVEY CONTROL
 DF9498
 DF9498* NAD 83(2011) POSITION- 42 47 18.71175(N) 087 54 52.68350(W)    ADJUSTED
 DF9498* NAD 83(2011) ELLIP HT-   184.647 (meters)        (06/27/12)    ADJUSTED
 DF9498* NAD 83(2011) EPOCH    -  2010.00
 DF9498* NAVD 88 ORTHO HEIGHT -   219.444  (meters)     719.96  (feet) ADJUSTED
 DF9498
 DF9498  NAD 83(2011) X  -    170,591.976 (meters)                     COMP
 DF9498  NAD 83(2011) Y  - -4,684,973.918 (meters)                     COMP
 DF9498  NAD 83(2011) Z  -  4,310,416.532 (meters)                     COMP
 DF9498  LAPLACE CORR    -         -1.71  (seconds)                    DEFLEC12A
 DF9498  GEOID HEIGHT    -        -34.80  (meters)                     GEOID12A
 DF9498  DYNAMIC HEIGHT  -        219.381 (meters)      719.75  (feet) COMP
 DF9498  MODELED GRAVITY -    980,330.4   (mgal)                      NAVD 88
 DF9498
 DF9498  VERT ORDER      -  SECOND    CLASS I
 DF9498
 DF9498  FGDC Geospatial Positioning Accuracy Standards (95% confidence, cm)
 DF9498  Type                                          Horiz  Ellip  Dist(km)
 DF9498  ----------------------------------------------------------------------
 DF9498  NETWORK                                        0.33   0.41
 DF9498  ----------------------------------------------------------------------
 DF9498  MEDIAN LOCAL ACCURACY AND DIST (011 points)   0.33   0.37      8.73
 DF9498  ----------------------------------------------------------------------
 DF9498  NOTE: Click here for information on individual local accuracy
 DF9498  values and other accuracy information.
 DF9498
 DF9498
 DF9498.The horizontal coordinates were established by GPS observations
 DF9498.and adjusted by the National Geodetic Survey in June 2012.
 DF9498
 DF9498.NAD 83(2011) refers to NAD 83 coordinates where the reference
 DF9498.frame has been affixed to the stable North American tectonic plate. See
 DF9498.NA2011 for more information. for more information.
 DF9498
 DF9498.The horizontal coordinates are valid at the epoch date displayed above
 DF9498.which is a decimal equivalence of Year/Month/Day.
 DF9498
 DF9498.The orthometric height was determined by differential leveling and
 DF9498.adjusted by the WI DEPT OF TRANSP
 DF9498.in May 2012.
 DF9498
 DF9498.Photographs are available for this station.
```

DF9498
DF9498.The X, Y, and Z were computed from the position and the ellipsoidal ht.
DF9498
DF9498.The Laplace correction was computed from DEFLEC12A derived deflections.
DF9498
DF9498.The ellipsoidal height was determined by GPS observations
DF9498.and is referenced to NAD 83.
DF9498
DF9498.The dynamic height is computed by dividing the NAVD 88
DF9498.geopotential number by the normal gravity value computed on the
DF9498.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
DF9498.degrees latitude (g = 980.6199 gals.).
DF9498
DF9498.The modeled gravity was interpolated from observed gravity values.
DF9498
DF9498. The following values were computed from the NAD 83(2011) position.
DF9498

DF9498;		North	East	Units	Scale Factor	Converg.
DF9498;SPC WI S	-	89,732.320	770,605.109	MT	0.99998933	+1 25 58.3
DF9498;SPC WI S	-	294,396.79	2,528,226.93	sFT	0.99998933	+1 25 58.3
DF9498;UTM 16	-	4,737,737.572	425,194.263	MT	0.99966884	-0 37 16.8

DF9498

DF9498!	-	Elev Factor	x	Scale Factor	=	Combined Factor
DF9498!SPC WI S	-	0.99997104	x	0.99998933	=	0.99996037
DF9498!UTM 16	-	0.99997104	x	0.99966884	=	0.99963989

DF9498
DF9498 SUPERSEDED SURVEY CONTROL
DF9498

DF9498						
DF9498	NAD 83(2007)-	42 47 18.71159(N)	087 54 52.68433(W)	AD( )	0	
DF9498	ELLIP H (02/10/07)	184.677 (m)		GP( )		
DF9498	NAD 83(1997)-	42 47 18.71181(N)	087 54 52.68453(W)	AD( )	1	
DF9498	ELLIP H (04/02/04)	184.689 (m)		GP( )	4	1
DF9498	NAVD 88 (07/26/07)	219.42 (m)	719.9 (f)	LEVELING	3	
DF9498	NAVD 88 (04/20/07)	219.420 (m)	719.88 (f)	SUPERSEDED	2	1
DF9498	NAVD 88 (04/02/04)	219.44 (m)	719.9 (f)	LEVELING	3	
DF9498	NAVD 88 (02/25/04)	219.444 (m)	719.96 (f)	SUPERSEDED	2	1

DF9498
DF9498.Superseded values are not recommended for survey control.
DF9498
DF9498.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
DF9498.See file dsdata.txt to determine how the superseded data were derived.
DF9498
DF9498_U.S. NATIONAL GRID SPATIAL ADDRESS: 16TDN2519437737(NAD 83)
DF9498
DF9498_MARKER: DD = SURVEY DISK
DF9498_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
DF9498_STAMPING: CALEDONIA W GPS 2002
DF9498_MARK LOGO: WIDT
DF9498_PROJECTION: FLUSH
DF9498_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
DF9498_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
DF9498_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
DF9498+SATELLITE: SATELLITE OBSERVATIONS - June 11, 2008
DF9498

DF9498	HISTORY	- Date	Condition	Report By
DF9498	HISTORY	- 2001	MONUMENTED	WIDT
DF9498	HISTORY	- 20080611	GOOD	WIDT

DF9498
DF9498 STATION DESCRIPTION
DF9498
DF9498'DESCRIBED BY WI DEPT OF TRANSP 2001 (DJH)

DF9498'THE STATION IS LOCATED ABOUT 28 KM SOUTH OF MILWAUKEE AND 12 KM
DF9498'WEST-NORTHWEST OF RACINE. OWNERSHIP--RACINE COUNTY. TO REACH THE
DF9498'STATION FROM THE JUNCTION OF STATE HIGHWAY 31 WITH STATE HIGHWAY 32
DF9498'ABOUT 12 KM NORTHWEST OF RACINE, GO SOUTH ON STATE HIGHWAY 31 FOR 0.2
DF9498'KM TO COUNTY HIGHWAY G, TURN RIGHT AND GO WEST ON COUNTY HIGHWAY G
DF9498'FOR 6.2 KM TO COUNTY HIGHWAY H ON THE LEFT, TURN LEFT AND GO SOUTH ON
DF9498'COUNTY HIGHWAY H FOR 1.6 KM TO 5 MILE ROAD ON THE LEFT, CONTINUE
DF9498'SOUTH ON COUNTY HIGHWAY H FOR 1.3 KM TO THE STATION ON THE LEFT. THE
DF9498'STATION IS A BRONZE WISCONSIN DEPARTMENT OF TRANSPORTATION GEODETIC
DF9498'SURVEY CONTROL STATION DISK SET IN THE TOP OF A 41-CM DIAMETER
DF9498'CONCRETE POST SET TO A DEPTH OF 2.4 M AND ABOUT LEVEL WITH THE
DF9498'HIGHWAY PAVEMENT. THE STATION IS 13.1 M EAST OF THE CENTERLINE OF
DF9498'COUNTY HIGHWAY H, 40 M SOUTH OF EXTENDED CENTERLINE OF OF PRIVATE
DF9498'ENTRANCE --5222 MCCAULEYS--, 26.9 M NORTHEAST OF POWER POLE
DF9498'--E62-0678--, AND 3 M WEST OF A CULTIVATED FIELD. ---NOTE---THE
DF9498'STATION IS NORTH-NORTHWEST, SOUTH-SOUTHWEST AND EAST OF THREE ORANGE
DF9498'4X4 PLASTIC WITNESS POSTS. ---NOTE2---THIS STATION HAS NO VISIBLE
DF9498'OBSTRUCTIONS EXTENDING HIGHER THAN 20 DEGREES ABOVE THE HORIZON.
DF9498
DF9498 STATION RECOVERY (2008)
DF9498
DF9498'RECOVERY NOTE BY WI DEPT OF TRANSP 2008 (MAB)
DF9498'RECOVERED IN GOOD CONDITION. REPLACED ONE BROKEN GUARD POST. THE
DF9498'STATION IS 1.0 M NORTH AND 1.0 M SOUTH OF TWO 4X4 ORANGE PLASTIC GUARD
DF9498'POSTS.

*** retrieval complete.
Elapsed Time = 00:00:04

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.00
1        National Geodetic Survey,   Retrieval Date = FEBRUARY 25, 2013
 DF9480 ***********************************************************************
 DF9480  DESIGNATION -  1K78
 DF9480  PID         -  DF9480
 DF9480  STATE/COUNTY-  WI/RACINE
 DF9480  COUNTRY     -  US
 DF9480  USGS QUAD   -  UNION GROVE (1971)
 DF9480
 DF9480                         *CURRENT SURVEY CONTROL
 DF9480
 DF9480* NAD 83(1986) POSITION- 42 41 16.3     (N) 088 06 37.3     (W)    HD_HELD2
 DF9480* NAVD 88 ORTHO HEIGHT -    249.465   (meters)      818.45   (feet) ADJUSTED
 DF9480
 DF9480  GEOID HEIGHT    -         -34.56   (meters)                       GEOID12A
 DF9480  DYNAMIC HEIGHT  -         249.391  (meters)      818.21   (feet) COMP
 DF9480  MODELED GRAVITY -     980,317.3    (mgal)                         NAVD 88
 DF9480
 DF9480  VERT ORDER      -  SECOND    CLASS I
 DF9480
 DF9480.The horizontal coordinates were established by autonomous hand held GPS
 DF9480.observations and have an estimated accuracy of +/- 10 meters.
 DF9480.
 DF9480.The orthometric height was determined by differential leveling and
 DF9480.adjusted by the WI DEPT OF TRANSP
 DF9480.in May 2012.
 DF9480
 DF9480.Photographs are available for this station.
 DF9480
 DF9480.The dynamic height is computed by dividing the NAVD 88
 DF9480.geopotential number by the normal gravity value computed on the
 DF9480.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 DF9480.degrees latitude (g = 980.6199 gals.).
 DF9480
 DF9480.The modeled gravity was interpolated from observed gravity values.
 DF9480
 DF9480;                    North         East     Units  Estimated Accuracy
 DF9480;SPC WI S     -    78,170.      754,849.      MT  (+/- 10 meters HH2 GPS)
 DF9480
 DF9480                           SUPERSEDED SURVEY CONTROL
 DF9480
 DF9480  NAVD 88 (04/20/07)  249.440  (m)           818.37   (f) SUPERSEDED  2 1
 DF9480  NAVD 88 (02/25/04)  249.463  (m)           818.45   (f) SUPERSEDED  2 1
 DF9480
 DF9480.Superseded values are not recommended for survey control.
 DF9480
 DF9480.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
 DF9480.See file dsdata.txt to determine how the superseded data were derived.
 DF9480
 DF9480_U.S. NATIONAL GRID SPATIAL ADDRESS: 16TDN0903926750(NAD 83)
 DF9480
 DF9480_MARKER: DD = SURVEY DISK
```

DF9480_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
DF9480_STAMPING: 1K78 2002
DF9480_MARK LOGO: WIDT
DF9480_PROJECTION: FLUSH
DF9480_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
DF9480_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
DF9480_SATELLITE: THE SITE LOCATION WAS REPORTED AS NOT SUITABLE FOR
DF9480+SATELLITE: SATELLITE OBSERVATIONS - July 11, 2006
DF9480

DF9480	HISTORY	- Date	Condition	Report By
DF9480	HISTORY	- 2001	MONUMENTED	WIDT
DF9480	HISTORY	- 20060711	GOOD	WIDT
DF9480	HISTORY	- 20090410	GOOD	GEOCAC

DF9480
DF9480 STATION DESCRIPTION
DF9480
DF9480'DESCRIBED BY WI DEPT OF TRANSP 2001 (DJH)
DF9480'THE STATION IS LOCATED ABOUT 27 KM WEST-SOUTHWEST OF RACINE, 13 KM
DF9480'EAST OF BURLINGTON, 12 KM SOUTHEAST OF WATERFORD.
DF9480'OWNERSHIP--WISCONSIN DEPARTMENT OF TRANSPORTATION. TO REACH THE
DF9480'STATION FROM THE JUNCTION OF STATE HIGHWAY 11 (DURAND AVENUE) WITH
DF9480'STATE HIGHWAY 75 (BEAUMONT AVENUE) IN THE COMMUNITY OF KANSASVILLE,
DF9480'GO SOUTH ON STATE HIGHWAY 75 (BEAUMONT AVENUE) FOR 0.1 KM TO THE
DF9480'STATION ON THE LEFT. THE STATION IS A BRONZE WISCONSIN DEPARTMENT OF
DF9480'TRANSPORTATION GEODETIC SURVEY CONTROL STATION DISK SET IN THE TOP OF
DF9480'A 41-CM DIAMETER CONCRETE POST SET TO A DEPTH OF 2.4 M AND ABOUT
DF9480'LEVEL WITH THE HIGHWAY PAVEMENT. THE STATION IS 11.0 M EAST OF THE
DF9480'CENTERLINE OF STATE HIGHWAY 75 (BEAUMONT AVENUE), 57 M SOUTH OF THE
DF9480'CENTERLINE OF STATE HIGHWAY 11 (DURAND AVENUE), 28.3 M NORTHWEST OF
DF9480'THE NORTHWEST CORNER OF THE BRICK POST OFFICE, AND 16.3 M NORTH OF
DF9480'THE CENTERLINE OF THE NORTHERNMOST ENTRANCE TO THE POST OFFICE.
DF9480'---NOTE---THE STATION HAS NO VISIBLE OBSTRUCTIONS EXTENDING HIGHER
DF9480'THAN 20 DEGREES ABOVE THE HORIZON EXCEPT FOR A POWER POLE TO THE
DF9480'SOUTH-SOUTHWEST EXTENDING TO 28 DEGREES, A POWER POLE TO THE
DF9480'WEST-SOUTHWEST EXTENDING TO 40 DEGREES, A TREE TO THE WEST EXTENDING
DF9480'TO 35 DEGREES, A TREE TO THE NORTHWEST EXTENDING TO 30 DEGREES, A
DF9480'POWERPOLE TO THE NORTHWEST EXTENDING TO 40 DEGREES, AND A TREE TO THE
DF9480'EAST-NORTHEAST EXTENDING TO 30 DEGREES.
DF9480
DF9480 STATION RECOVERY (2006)
DF9480
DF9480'RECOVERY NOTE BY WI DEPT OF TRANSP 2006 (DRB)
DF9480'RECOVERED IN GOOD CONDITION. ADD-- THE STATION IS 12.2 M EAST OF THE
DF9480'DOUBLE YELLOW STRIPE ON STATE HIGHWAY 75, 9.1 M EAST OF THE WHITE
DF9480'STRIPE SEPARATING THE NORTHBOUND LANE OF STATE HIGHWAY 75 AND THE LEFT
DF9480'TURNING LANE ONTO STATE HIGHWAY 11, 5.6 M EAST OF THE EAST EDGE OF THE
DF9480'NORTHBOUND PAVEMENT AT THE WHITE FOG LINE, 14.8 M NORTH OF THE
DF9480'CENTERLINE OF THE NORTH ENTRANCE TO THE POST OFFICE,
DF9480'5.6 M NORTHEAST OF THE TOP CENTER OF THE SOUTH END AND 5.4 M SOUTHEAST
DF9480'OF THE TOP CENTER OF THE NORTH END OF A 50 CM DIAMETER NORTH-SOUTH
DF9480'METAL CULVERT, AND 1.0 M WEST, 1.0 M NORTH, AND 1.0 M SOUTH OF THREE
DF9480'WHITE PLASTIC WITNESS POSTS. NOTE-- VISIBLE OBSTRUCTIONS AT THIS
DF9480'STATION ARE TREES IN THE EAST QUADRANTS EXTENDING TO 30 DEGREES ABOVE
DF9480'THE HORIZON.
DF9480
DF9480 STATION RECOVERY (2009)
DF9480
DF9480'RECOVERY NOTE BY GEOCACHING 2009 (MBK)
DF9480'FOUND IN GOOD CONDITION

*** retrieval complete.

Elapsed Time = 00:00:01

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.00
1        National Geodetic Survey,   Retrieval Date = FEBRUARY 25, 2013
 DG4952 ***********************************************************************
 DG4952  HT_MOD      -  This is a Height Modernization Survey Station.
 DG4952  DESIGNATION -  RAYMOND S GPS
 DG4952  PID         -  DG4952
 DG4952  STATE/COUNTY-  WI/RACINE
 DG4952  COUNTRY     -  US
 DG4952  USGS QUAD   -  FRANKSVILLE (1994)
 DG4952
 DG4952                        *CURRENT SURVEY CONTROL
 DG4952
 DG4952  ______________________________________________________________________
 DG4952* NAD 83(2011) POSITION- 42 45 27.37398(N) 087 59 02.54896(W)    ADJUSTED
 DG4952* NAD 83(2011) ELLIP HT-   182.515 (meters)        (06/27/12)    ADJUSTED
 DG4952* NAD 83(2011) EPOCH   -  2010.00
 DG4952* NAVD 88 ORTHO HEIGHT -   217.22   (meters)     712.7   (feet) GPS OBS
 DG4952  ______________________________________________________________________
 DG4952  NAD 83(2011) X  -    164,998.581 (meters)                      COMP
 DG4952  NAD 83(2011) Y  - -4,687,507.326 (meters)                      COMP
 DG4952  NAD 83(2011) Z  -  4,307,893.079 (meters)                      COMP
 DG4952  LAPLACE CORR    -         -1.72  (seconds)                     DEFLEC12A
 DG4952  GEOID HEIGHT    -        -34.73  (meters)                      GEOID12A
 DG4952
 DG4952  FGDC Geospatial Positioning Accuracy Standards (95% confidence, cm)
 DG4952  Type                                           Horiz  Ellip  Dist(km)
 DG4952  ----------------------------------------------------------------------
 DG4952  NETWORK                                         0.31   0.39
 DG4952  ----------------------------------------------------------------------
 DG4952  MEDIAN LOCAL ACCURACY AND DIST (015 points)    0.35   0.39     11.64
 DG4952  ----------------------------------------------------------------------
 DG4952  NOTE: Click here for information on individual local accuracy
 DG4952  values and other accuracy information.
 DG4952
 DG4952
 DG4952.The horizontal coordinates were established by GPS observations
 DG4952.and adjusted by the National Geodetic Survey in June 2012.
 DG4952
 DG4952.NAD 83(2011) refers to NAD 83 coordinates where the reference
 DG4952.frame has been affixed to the stable North American tectonic plate. See
 DG4952.NA2011 for more information. for more information.
 DG4952
 DG4952.The horizontal coordinates are valid at the epoch date displayed above
 DG4952.which is a decimal equivalence of Year/Month/Day.
 DG4952
 DG4952.The orthometric height was determined by GPS observations and a
 DG4952.high-resolution geoid model using precise GPS observation and
 DG4952.processing techniques.
 DG4952
 DG4952.Photographs are available for this station.
 DG4952
 DG4952.The X, Y, and Z were computed from the position and the ellipsoidal ht.
 DG4952
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DG4952.The Laplace correction was computed from DEFLEC12A derived deflections.
DG4952
DG4952.The ellipsoidal height was determined by GPS observations
DG4952.and is referenced to NAD 83.
DG4952
DG4952. The following values were computed from the NAD 83(2011) position.
DG4952

		North	East	Units	Scale Factor	Converg.
DG4952;SPC WI S	-	86,158.065	765,011.048	MT	0.99999519	+1 23 06.6
DG4952;SPC WI S	-	282,670.25	2,509,873.75	sFT	0.99999519	+1 23 06.6
DG4952;UTM 16	-	4,734,367.158	419,477.524	MT	0.99967977	-0 40 05.2

DG4952

		Elev Factor	x	Scale Factor	=	Combined Factor
DG4952!SPC WI S	-	0.99997138	x	0.99999519	=	0.99996657
DG4952!UTM 16	-	0.99997138	x	0.99967977	=	0.99965116

DG4952

DG4952 SUPERSEDED SURVEY CONTROL

DG4952

DG4952 NAD 83(2007)-	42 45 27.37382(N)	087 59 02.54982(W)	AD( )	0	
DG4952 ELLIP H (02/10/07)	182.545 (m)		GP( )		
DG4952 NAD 83(1997)-	42 45 27.37403(N)	087 59 02.55000(W)	AD( )	1	
DG4952 ELLIP H (04/02/04)	182.557 (m)		GP( )	4 1	
DG4952 NAVD 88 (04/02/04)	217.24 (m)	GEOID03 model used	GPS OBS		

DG4952
DG4952.Superseded values are not recommended for survey control.
DG4952
DG4952.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
DG4952.See file dsdata.txt to determine how the superseded data were derived.
DG4952
DG4952_U.S. NATIONAL GRID SPATIAL ADDRESS: 16TDN1947734367(NAD 83)
DG4952
DG4952_MARKER: DD = SURVEY DISK
DG4952_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
DG4952_STAMPING: RAYMOND S GPS 2002
DG4952_MARK LOGO: WIDT
DG4952_PROJECTION: FLUSH
DG4952_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
DG4952_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
DG4952_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
DG4952+SATELLITE: SATELLITE OBSERVATIONS - June 11, 2008
DG4952

DG4952 HISTORY	- Date	Condition	Report By	
DG4952 HISTORY	- 2001	MONUMENTED	WIDT	
DG4952 HISTORY	- 20080611	GOOD	WIDT	

DG4952

DG4952 STATION DESCRIPTION

DG4952
DG4952'DESCRIBED BY WI DEPT OF TRANSP 2001 (DJH)
DG4952'THE STATION IS LOCATED ABOUT 16 KM WEST-NORTHWEST OF RACINE, 13 KM
DG4952'NORTHEAST OF UNION GROVE AND 9 KM WEST OF FRANKSVILLE.
DG4952'OWNERSHIP--TOWN OF RAYMOND. TO REACH THE STATION FROM THE JUNCTION OF
DG4952'INTERSTATE 94 WITH STATE HIGHWAY 20 ABOUT 14 KM WEST OF RACINE, GO
DG4952'WEST ON STATE HIGHWAY 20 FOR 2.5 KM TO 53RD STREET ON THE RIGHT, TURN
DG4952'RIGHT AND GO NORTH ON 53RD STREET FOR 2.7 KM TO 2 MILE ROAD, CONTINUE
DG4952'NORTHWEST ON 51ST STREET FOR 1.0 KM TO THE STATION ON THE LEFT. THE
DG4952'STATION IS A BRONZE WISCONSIN DEPARTMENT OF TRANSPORTATION GEODETIC
DG4952'SURVEY CONTROL STATION DISK SET IN THE TOP OF A 41-CM DIAMETER
DG4952'CONCRETE POST SET TO A DEPTH OF 2.4 M AND ABOUT LEVEL WITH THE STREET
DG4952'PAVEMENT. THE STATION IS 10.2 M WEST-SOUTHWEST OF THE CENTERLINE OF
DG4952'51ST STREET, 73 M WEST-NORTHWEST OF THE CENTERLINE OF 2 MILE ROAD,
DG4952'19.4 M SOUTHWEST OF POWER POLE --98-17085-- , AND 3 M EAST-NORTHEAST

DG4952'OF A CULTIVATED FIELD. ---NOTE---THE STATION IS SOUTH, NORTHEAST AND
DG4952'NORTHWEST OF AN ORANGE 4X4 PLASTIC WITNESS POST. ---NOTE2---THIS
DG4952'STATION HAS NO VISIBLE OBSTRUCTIONS EXTENDING HIGHER THAN 20 DEGREES
DG4952'ABOVE THE HORIZON.
DG4952'
DG4952'
DG4952
DG4952 STATION RECOVERY (2008)
DG4952
DG4952'RECOVERY NOTE BY WI DEPT OF TRANSP 2008 (MAB)
DG4952'RECOVERED IN GOOD CONDITION. REPLACED ONE BROKEN GUARD POST. THE
DG4952'STATION IS 1.0 M SOUTH, 1.0 M NORTHEAST, AND 1.0 M NORTHWEST OF THREE
DG4952'4X4 ORANGE PLASTIC GUARD POSTS.

*** retrieval complete.
Elapsed Time = 00:00:03

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.00
1         National Geodetic Survey,   Retrieval Date = FEBRUARY 25, 2013
 DF9481 ***********************************************************************
 DF9481  DESIGNATION -  UNION GROVE GPS
 DF9481  PID         -  DF9481
 DF9481  STATE/COUNTY-  WI/RACINE
 DF9481  COUNTRY     -  US
 DF9481  USGS QUAD   -  UNION GROVE (1971)
 DF9481
 DF9481                         *CURRENT SURVEY CONTROL
 DF9481  ______________________________________________________________________
 DF9481* NAD 83(2011) POSITION- 42 41 12.50502(N) 088 03 43.27000(W)    ADJUSTED
 DF9481* NAD 83(2011) ELLIP HT-   209.675 (meters)        (06/27/12)    ADJUSTED
 DF9481* NAD 83(2011) EPOCH    -  2010.00
 DF9481* NAVD 88 ORTHO HEIGHT -   244.275  (meters)     801.43   (feet) ADJUSTED
 DF9481  ______________________________________________________________________
 DF9481  NAD 83(2011) X  -    158,799.977 (meters)                      COMP
 DF9481  NAD 83(2011) Y  - -4,693,080.320 (meters)                      COMP
 DF9481  NAD 83(2011) Z  -  4,302,133.555 (meters)                      COMP
 DF9481  LAPLACE CORR    -         -2.64  (seconds)                     DEFLEC12A
 DF9481  GEOID HEIGHT    -        -34.61  (meters)                      GEOID12A
 DF9481  DYNAMIC HEIGHT  -        244.202 (meters)      801.19   (feet) COMP
 DF9481  MODELED GRAVITY -    980,317.7   (mgal)                        NAVD 88
 DF9481
 DF9481  VERT ORDER      -  SECOND    CLASS I
 DF9481
 DF9481  FGDC Geospatial Positioning Accuracy Standards (95% confidence, cm)
 DF9481  Type                                          Horiz  Ellip  Dist(km)
 DF9481  ----------------------------------------------------------------------
 DF9481  NETWORK                                        0.37   0.47
 DF9481  ----------------------------------------------------------------------
 DF9481  MEDIAN LOCAL ACCURACY AND DIST (014 points)   0.40   0.45       9.86
 DF9481  ----------------------------------------------------------------------
 DF9481  NOTE: Click here for information on individual local accuracy
 DF9481  values and other accuracy information.
 DF9481
 DF9481
 DF9481.The horizontal coordinates were established by GPS observations
 DF9481.and adjusted by the National Geodetic Survey in June 2012.
 DF9481
 DF9481.NAD 83(2011) refers to NAD 83 coordinates where the reference
 DF9481.frame has been affixed to the stable North American tectonic plate. See
 DF9481.NA2011 for more information. for more information.
 DF9481
 DF9481.The horizontal coordinates are valid at the epoch date displayed above
 DF9481.which is a decimal equivalence of Year/Month/Day.
 DF9481
 DF9481.The orthometric height was determined by differential leveling and
 DF9481.adjusted by the WI DEPT OF TRANSP
 DF9481.in May 2012.
 DF9481
 DF9481.Photographs are available for this station.
```

DF9481
DF9481.The X, Y, and Z were computed from the position and the ellipsoidal ht.
DF9481
DF9481.The Laplace correction was computed from DEFLEC12A derived deflections.
DF9481
DF9481.The ellipsoidal height was determined by GPS observations
DF9481.and is referenced to NAD 83.
DF9481
DF9481.The dynamic height is computed by dividing the NAVD 88
DF9481.geopotential number by the normal gravity value computed on the
DF9481.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
DF9481.degrees latitude (g = 980.6199 gals.).
DF9481
DF9481.The modeled gravity was interpolated from observed gravity values.
DF9481
DF9481. The following values were computed from the NAD 83(2011) position.
DF9481

DF9481;		North	East	Units	Scale Factor	Converg.
DF9481;SPC WI S	-	78,144.206	758,812.292	MT	1.00000971	+1 19 53.7
DF9481;SPC WI S	-	256,378.12	2,489,536.66	sFT	1.00000971	+1 19 53.7
DF9481;UTM 16	-	4,726,582.909	412,997.777	MT	0.99969312	-0 43 12.3

DF9481

DF9481!		Elev Factor	x	Scale Factor	=	Combined Factor
DF9481!SPC WI S	-	0.99996712	x	1.00000971	=	0.99997683
DF9481!UTM 16	-	0.99996712	x	0.99969312	=	0.99966025

DF9481
DF9481 SUPERSEDED SURVEY CONTROL
DF9481

DF9481	NAD 83(2007)-	42 41 12.50489(N)	088 03 43.27089(W)		AD( )	0	
DF9481	ELLIP H (02/10/07)	209.708 (m)			GP( )		
DF9481	NAD 83(1997)-	42 41 12.50509(N)	088 03 43.27103(W)		AD( )	1	
DF9481	ELLIP H (04/02/04)	209.721 (m)			GP( )	4	1
DF9481	NAVD 88 (07/26/07)	244.25 (m)	801.3	(f)	LEVELING	3	
DF9481	NAVD 88 (04/20/07)	244.250 (m)	801.34	(f)	SUPERSEDED	2	1
DF9481	NAVD 88 (04/02/04)	244.27 (m)	801.4	(f)	LEVELING	3	
DF9481	NAVD 88 (02/25/04)	244.273 (m)	801.42	(f)	SUPERSEDED	2	1

DF9481
DF9481.Superseded values are not recommended for survey control.
DF9481
DF9481.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
DF9481.See file dsdata.txt to determine how the superseded data were derived.
DF9481
DF9481_U.S. NATIONAL GRID SPATIAL ADDRESS: 16TDN1299726582(NAD 83)
DF9481
DF9481_MARKER: DD = SURVEY DISK
DF9481_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
DF9481_STAMPING: UNION GROVE GPS 2002
DF9481_MARK LOGO: WIDT
DF9481_PROJECTION: FLUSH
DF9481_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
DF9481_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
DF9481_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
DF9481+SATELLITE: SATELLITE OBSERVATIONS - June 10, 2008
DF9481

DF9481	HISTORY	- Date	Condition	Report By
DF9481	HISTORY	- 2001	MONUMENTED	WIDT
DF9481	HISTORY	- 20080610	GOOD	WIDT

DF9481
DF9481 STATION DESCRIPTION
DF9481
DF9481'DESCRIBED BY WI DEPT OF TRANSP 2001 (DJH)

DF9481'THE STATION IS LOCATED ABOUT 23 KM WEST-SOUTHWEST OF RACINE, 22 KM
DF9481'NORTHWEST OF KENOSHA IN THE VILLAGE OF UNION GROVE.
DF9481'OWNERSHIP--VILLAGE OF UNION GROVE. TO REACH THE STATION FROM THE
DF9481'JUNCTION OF US HIGHWAY 45 (MAIN STREET) WITH STATE HIGHWAY 11 (15TH
DF9481'AVENUE) IN THE VILLAGE OF UNION GROVE, GO WEST ON STATE HIGHWAY 11
DF9481'FOR 0.8 KM TO YORK STREET ON THE RIGHT, TURN RIGHT AND GO NORTH ON
DF9481'YORK STREET FOR 0.4 KM TO A RAILROAD CROSSING AND THE STATION ON THE
DF9481'LEFT. THE STATION IS A BRONZE WISCONSIN DEPARTMENT OF TRANSPORTATION
DF9481'GEODETIC SURVEY CONTROL STATION DISK SET IN THE TOP OF A 41-CM
DF9481'DIAMETER CONCRETE POST SET TO A DEPTH OF 2.4 M AND ABOUT LEVEL WITH
DF9481'THE STREET PAVEMENT. THE STATION IS 24.0 M WEST OF THE CENTERLINE OF
DF9481'YORK STREET, 45.4 M NORTH OF THE EXTENDED CENTERLINE OF 11TH STREET,
DF9481'AND 9.4 M SOUTH OF THE SOUTHERNMOST RAIL OF THE RAILROAD TRACKS.
DF9481'---NOTE---THE STATION IS 1.0 M SOUTH OF A WHITE PLASTIC WITNESS POST.
DF9481' ---NOTE2---THIS STATION HAS NO VISIBLE OBSTRUCTIONS EXTENDING HIGHER
DF9481'THAN 15 DEGREES ABOVE THE HORIZON EXCEPT FOR POWER POLES TO THE EAST
DF9481'AND EAST-NORTHEAST EXTENDING TO 20 DEGREES AND A TREE TO THE
DF9481'NORTHEAST EXTENDING TO 30 DEGREES.
DF9481
DF9481 STATION RECOVERY (2008)
DF9481
DF9481'RECOVERY NOTE BY WI DEPT OF TRANSP 2008 (MAB)
DF9481'RECOVERED IN GOOD CONDITION. THE STATION IS 1.0 M WEST, 1.0 M
DF9481'NORTHEAST, AND 1.0 M SOUTHEAST OF THREE 4X4 ORANGE PLASTIC GUARD
DF9481'POSTS. A TREE TO THE NORTHWEST EXTENDS TO 30 DEGREES ABOVE THE
DF9481'HORIZON.

*** retrieval complete.
Elapsed Time = 00:00:11

The NGS Data Sheet

See file dsdata.txt for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.00
1        National Geodetic Survey,   Retrieval Date = FEBRUARY 25, 2013
 DF9483 ***********************************************************************
 DF9483  DESIGNATION -  YORKVILLE E GPS
 DF9483  PID         -  DF9483
 DF9483  STATE/COUNTY-  WI/RACINE
 DF9483  COUNTRY     -  US
 DF9483  USGS QUAD   -  STURTEVANT (1994)
 DF9483
 DF9483                         *CURRENT SURVEY CONTROL
 DF9483 ______________________________________________________________________
 DF9483* NAD 83(2011) POSITION- 42 41 39.85778(N) 087 58 38.20676(W)    ADJUSTED
 DF9483* NAD 83(2011) ELLIP HT-   207.296 (meters)         (06/27/12)    ADJUSTED
 DF9483* NAD 83(2011) EPOCH    -  2010.00
 DF9483* NAVD 88 ORTHO HEIGHT -   241.992  (meters)      793.94   (feet) ADJUSTED
 DF9483 ______________________________________________________________________
 DF9483  NAD 83(2011) X  -    165,720.550 (meters)                       COMP
 DF9483  NAD 83(2011) Y  - -4,692,266.625 (meters)                       COMP
 DF9483  NAD 83(2011) Z  -  4,302,752.350 (meters)                       COMP
 DF9483  LAPLACE CORR    -         -1.85  (seconds)                      DEFLEC12A
 DF9483  GEOID HEIGHT    -        -34.70  (meters)                       GEOID12A
 DF9483  DYNAMIC HEIGHT  -        241.920 (meters)      793.70   (feet) COMP
 DF9483  MODELED GRAVITY -    980,317.2   (mgal)                         NAVD 88
 DF9483
 DF9483  VERT ORDER      -  SECOND    CLASS I
 DF9483
 DF9483  FGDC Geospatial Positioning Accuracy Standards (95% confidence, cm)
 DF9483  Type                                          Horiz  Ellip  Dist(km)
 DF9483  ----------------------------------------------------------------------
 DF9483  NETWORK                                        0.37   0.47
 DF9483  ----------------------------------------------------------------------
 DF9483  MEDIAN LOCAL ACCURACY AND DIST (012 points)   0.40   0.45       8.72
 DF9483  ----------------------------------------------------------------------
 DF9483  NOTE: Click here for information on individual local accuracy
 DF9483  values and other accuracy information.
 DF9483
 DF9483
 DF9483.The horizontal coordinates were established by GPS observations
 DF9483.and adjusted by the National Geodetic Survey in June 2012.
 DF9483
 DF9483.NAD 83(2011) refers to NAD 83 coordinates where the reference
 DF9483.frame has been affixed to the stable North American tectonic plate. See
 DF9483.NA2011 for more information. for more information.
 DF9483
 DF9483.The horizontal coordinates are valid at the epoch date displayed above
 DF9483.which is a decimal equivalence of Year/Month/Day.
 DF9483
 DF9483.The orthometric height was determined by differential leveling and
 DF9483.adjusted by the WI DEPT OF TRANSP
 DF9483.in May 2012.
 DF9483
 DF9483.Photographs are available for this station.
```

DF9483
DF9483.The X, Y, and Z were computed from the position and the ellipsoidal ht.
DF9483
DF9483.The Laplace correction was computed from DEFLEC12A derived deflections.
DF9483
DF9483.The ellipsoidal height was determined by GPS observations
DF9483.and is referenced to NAD 83.
DF9483
DF9483.The dynamic height is computed by dividing the NAVD 88
DF9483.geopotential number by the normal gravity value computed on the
DF9483.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
DF9483.degrees latitude (g = 980.6199 gals.).
DF9483
DF9483.The modeled gravity was interpolated from observed gravity values.
DF9483
DF9483. The following values were computed from the NAD 83(2011) position.
DF9483

		North	East	Units	Scale Factor	Converg.
DF9483;SPC WI S	-	79,152.916	765,734.684	MT	1.00000808	+1 23 23.3
DF9483;SPC WI S	-	259,687.53	2,512,247.88	sFT	1.00000808	+1 23 23.3
DF9483;UTM 16	-	4,727,342.847	419,949.604	MT	0.99967884	-0 39 45.8

DF9483

		Elev Factor	x	Scale Factor	=	Combined Factor
DF9483!SPC WI S	-	0.99996749	x	1.00000808	=	0.99997557
DF9483!UTM 16	-	0.99996749	x	0.99967884	=	0.99964634

DF9483
DF9483 SUPERSEDED SURVEY CONTROL
DF9483

DF9483 NAD 83(2007)-	42 41 39.85763(N)	087 58 38.20764(W)	AD( )	0			
DF9483 ELLIP H (02/10/07)	207.329 (m)		GP( )				
DF9483 NAD 83(1997)-	42 41 39.85786(N)	087 58 38.20781(W)	AD( )	1			
DF9483 ELLIP H (04/02/04)	207.343 (m)		GP( )	4	1		
DF9483 NAVD 88 (07/26/07)	241.97 (m)	793.9	(f)	LEVELING	3		
DF9483 NAVD 88 (04/20/07)	241.967 (m)	793.85	(f)	SUPERSEDED	2	1	
DF9483 NAVD 88 (04/02/04)	241.99 (m)	793.9	(f)	LEVELING	3		
DF9483 NAVD 88 (02/25/04)	241.990 (m)	793.93	(f)	SUPERSEDED	2	1	

DF9483
DF9483.Superseded values are not recommended for survey control.
DF9483
DF9483.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
DF9483.See file dsdata.txt to determine how the superseded data were derived.
DF9483
DF9483_U.S. NATIONAL GRID SPATIAL ADDRESS: 16TDN1994927342(NAD 83)
DF9483
DF9483_MARKER: DD = SURVEY DISK
DF9483_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
DF9483_STAMPING: YORKVILLE E GPS 2002
DF9483_MARK LOGO: WIDT
DF9483_PROJECTION: FLUSH
DF9483_MAGNETIC: R = STEEL ROD IMBEDDED IN MONUMENT
DF9483_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
DF9483_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
DF9483+SATELLITE: SATELLITE OBSERVATIONS - November 01, 2010
DF9483

DF9483 HISTORY	- Date	Condition	Report By	
DF9483 HISTORY	- 2001	MONUMENTED	WIDT	
DF9483 HISTORY	- 20060710	GOOD	WIDT	
DF9483 HISTORY	- 20090322	GOOD	INDIV	
DF9483 HISTORY	- 20101101	GOOD	JCLS	

DF9483
DF9483 STATION DESCRIPTION

DF9483
DF9483'DESCRIBED BY WI DEPT OF TRANSP 2001 (DJH)
DF9483'THE STATION IS LOCATED ABOUT 18 KM NORTHWEST OF KENOSHA AND 16 KM
DF9483'WEST-SOUTHWEST OF RACINE. OWNERSHIP--WISCONSIN DEPARTMENT OF
DF9483'TRANSPORTATION. TO REACH THE STATION FROM THE JUNCTION OF INTERSTATE
DF9483'HIGHWAY 94 WITH STATE HIGHWAY 11 (EXIT 335) ABOUT 5 KM WEST OF THE
DF9483'VILLAGE OF STURTEVANT, GO WEST ON STATE HIGHWAY 11 FOR 1.9 KM TO 56TH
DF9483'STREET AND THE STATION ON THE RIGHT. THE STATION IS A BRONZE
DF9483'WISCONSIN DEPARTMENT OF TRANSPORTATION GEODETIC SURVEY CONTROL
DF9483'STATION DISK SET IN THE TOP OF A 41-CM DIAMETER CONCRETE POST SET TO
DF9483'A DEPTH OF 2.4 M AND ABOUT LEVEL WITH THE STREET PAVEMENT. THE
DF9483'STATION IS 23.1 M NORTH OF THE CENTERLINE OF STATE HIGHWAY 11, 15.5 M
DF9483'SOUTH OF A WOOD POST FOR --RAILROAD CROSSING-- AND --STOP-- SIGNS,
DF9483'12.0 M EAST OF THE CENTERLINE OF 56TH STREET, AND 5.2 M EAST OF A
DF9483'METAL POST FOR A --CLASS B HIGHWAY BY ORDER OF YORKVILLE TOWN BOARD--
DF9483'SIGN. ---NOTE---THE STATION IS EAST-SOUTHEAST, SOUTHWEST AND NORTH
DF9483'OF AN ORANGE 4X4 PLASTIC WITNESS POST. ---NOTE2---THIS STATION HAS
DF9483'NO VISIBLE OBSTRUCTIONS EXTENDING HIGHER THAN 20 DEGREES ABOVE THE
DF9483'HORIZON.
DF9483
DF9483 STATION RECOVERY (2006)
DF9483
DF9483'RECOVERY NOTE BY WI DEPT OF TRANSP 2006 (DRB)
DF9483'RECOVERED IN GOOD CONDITION. NOTE-- STATE HIGHWAY 11 IS ALSO DURAND
DF9483'AVENUE.
DF9483
DF9483 STATION RECOVERY (2009)
DF9483
DF9483'RECOVERY NOTE BY INDIVIDUAL CONTRIBUTORS 2009
DF9483'RECOVERED IN GOOD CONDITION.
DF9483
DF9483 STATION RECOVERY (2010)
DF9483
DF9483'RECOVERY NOTE BY JOHN CHANCE LAND SURVEYS INC 2010
DF9483'RECOVERED IN GOOD CONDITION.

*** retrieval complete.
Elapsed Time = 00:00:02

WISCORS

KEHA (Trimble NetR5) Geographical coordinates
Latitude: 42° 33' 32.29917'' N
Longitude: 87° 55' 9.15144'' W
Ellipsoid Height: 204.203 m

SHAN (Trimble NetR5) Geographical coordinates
Latitude: 43° 44' 51.46198'' N
Longitude: 87° 44' 5.22551'' W
Ellipsoid Height: 152.946 m

SIWI (Trimble NetR5) Geographical coordinates
Latitude: 42° 52' 4.53392'' N
Longitude: 87° 58' 58.56228'' W
Ellipsoid Height: 190.721 m

RECORD OF U. S. PUBLIC LAND SURVEY CONTROL STATION

U. S. PUBLIC LAND SURVEY CORNER 2|2 / 2|2 T 4 N, R 22 E, RACINE COUNTY, WISCONSIN

HORIZONTAL CONTROL SURVEY BY: ALSTER & ASSOCIATES, INC. YEAR: 1966
VERTICAL CONTROL SURVEY BY: AYRES ASSOCIATES/SEWRPC YEAR: 2005

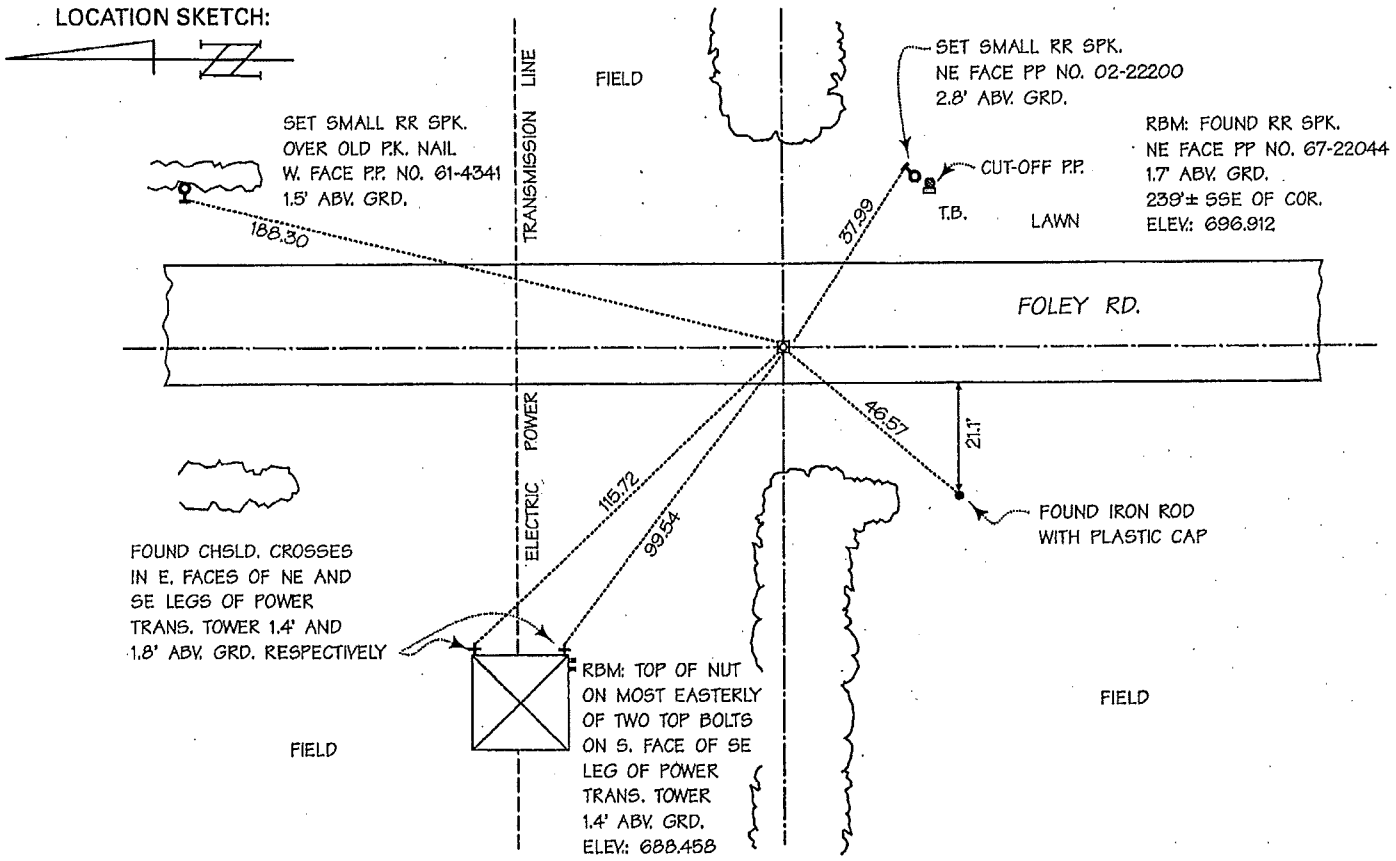
STATE PLANE COORDINATES OF: CENTER OF SECTION
NORTH 311,880.71
EAST 2,572,698.67
ELEVATION OF STATION: 690.855

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE
NORTH AMERICAN DATUM OF 1927

VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929 THETA ANGLE: +01-28-02

CONTROL ACCURACY:
HORIZONTAL: THIRD ORDER, CLASS I VERTICAL: SECOND ORDER, CLASS II

LOCATION SKETCH:



SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN)
WAUKESHA COUNTY) SS

I hereby certify that I found a concrete monument with SEWRPC brass cap as set to mark this corner in July 1966 by John H. Nielsen, S-338, Racine County Surveyor; replacing a 0.75-inch-diameter iron pipe then marking this corner, said iron pipe having been previously found and referenced by Charles B. Cape, Racine County Surveyor; that I referenced the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN
LELAND H.
KREBLIN
S-1960
SUSSEX
WI
LAND SURVEYOR

DATE OF SURVEY: 2 FEBRUARY 2005 Leland H. Kreblin S -1960
REGISTERED LAND SURVEYOR

FORM PREPARED BY SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

RACINE COUNTY, WISCONSIN
RECORD OF CONTROL SURVEY STATION

QUARTER SECTION CORNER 36|36 / 36|36 TOWNSHIP 3 N, RANGE 22 E, RACINE COUNTY, WISCONSIN

GEODETIC SURVEY BY: Alster & Associates Inc. Engineers YEAR: 1968

STATE PLANE COORDINATES OF: Section Corner

NORTH 253,629.03

EAST 2,579,345.57

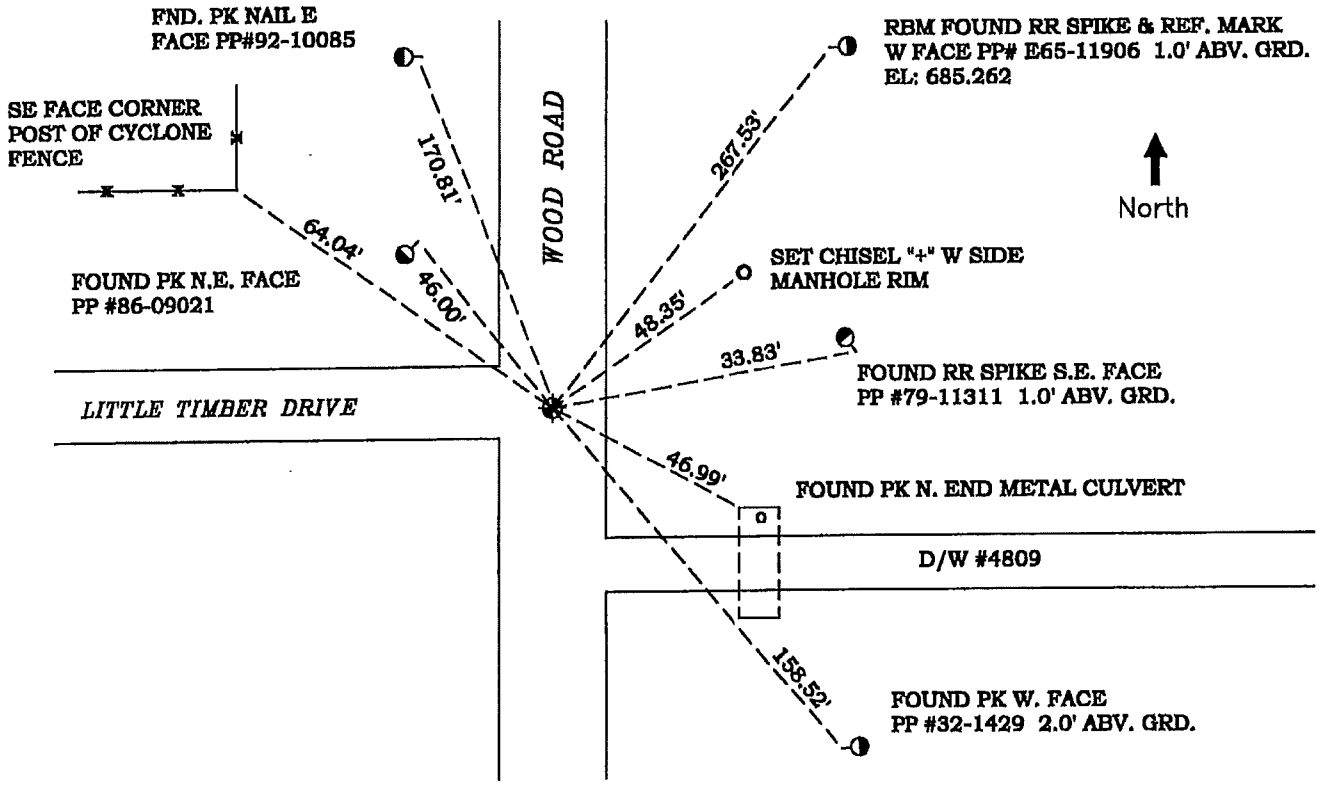
ELEVATION OF STATION 683.937 THETA ANGLE +01-28-49

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL AND VERTICAL CONTROL ACCURACY: SECOND ORDER

The corner is marked by a cast iron monument with a brass cap. The corner is located 0.50 mile north of C.T.H. KR, at the intersection of Wood Road and Little Timber Drive.



Bearing: N01-53-18W to Station C-125. Revised Traverse Station #259.

SURVEYOR'S AFFIDAVIT:
STATE OF WISCONSIN } SS
RACINE COUNTY

I found the concrete monument (brass cap broken off) set by John H. Nielsen S-338 on 4/30/68 whose location was established by retracement of a survey made in 1962 by James H. Larsen, S-130 for Joseph M. Miller, from iron stakes found in place
I set a replacement cast iron monument with a brass cap at the Nielsen location and I have referenced the same hereon.

WISCONSIN
DENNIS W. STEPHAN
S-1262
RACINE, WI
LAND SURVEYOR

DATE OF SURVEY 09/15/99 Dennis W. Stephan S- 1262 P- 155
REGISTERED LAND SURVEYOR

RECORD OF U. S. PUBLIC LAND SURVEY CONTROL STATION

U. S. PUBLIC LAND SURVEY CORNER 5/5 T 4 N, R 19 E, RACINE COUNTY, WISCONSIN

HORIZONTAL CONTROL SURVEY BY: NIELSEN & MADSEN CONSULTING ENGINEERS YEAR: 1976
VERTICAL CONTROL SURVEY BY: OWEN AYRES & ASSOC., INC./SEWRPC YEAR: 1990/2006

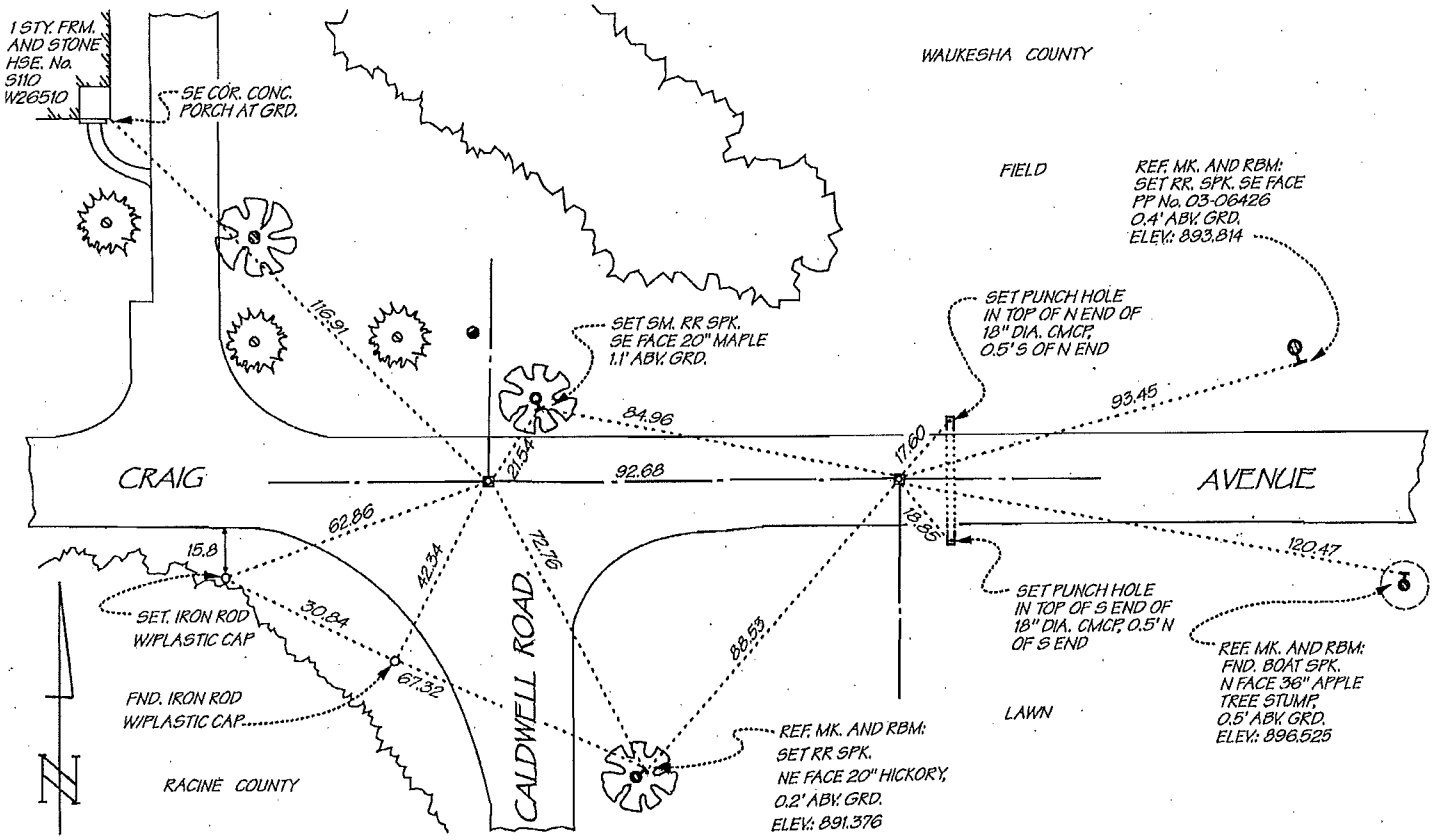
STATE PLANE COORDINATES OF: QUARTER SECTION CORNER
NORTH 311,668.75
EAST 2,462,153.06
ELEVATION OF STATION: 893.553

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE
NORTH AMERICAN DATUM OF 1927

VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929 THETA ANGLE: +1-11-01

CONTROL ACCURACY:
HORIZONTAL: THIRD ORDER, CLASS I VERTICAL: SECOND ORDER, CLASS II

LOCATION SKETCH:



SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN)
WAUKESHA COUNTY) SS

As Waukesha County Surveyor, I hereby certify that following street resurfacing I found a concrete monument with SEWRPC brass cap as set to mark the location of this closing corner on the township line; said concrete monument having been set and referenced by me as Waukesha County Surveyor, on July 14, 1990; replacing a broken cast iron monument; said cast iron monument with Racine County brass cap having been set to mark this closing corner in May 1977 by Dennis W. Stephan, S-1262, former Racine County Surveyor; said cast iron monument having been located by Mr. Stephan on the township line at a point equidistant from the northeast and northwest corners of Section 5, Township 4 North, Range 19 East, both corner locations being marked by a cast iron monument with Racine County brass cap; said cast iron monument set by Mr. Stephan being at a distance of 92.68 feet east of the standard corner then marked by an old, subsurface cut limestone monument--the closing distance determined from information shown on the official plat of Township 4 North, Range 19 East, dated April 1836 being 93.72 feet; that I have referenced the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN ... LAND SURVEYOR

DATE OF SURVEY: 7 JUNE 2006 Kurtis Bauer S - 157
REGISTERED LAND SURVEYOR

FORM PREPARED BY SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

RECORD OF U. S. PUBLIC LAND SURVEY CONTROL STATION

U. S. PUBLIC LAND SURVEY CORNER 5/5 T 4 N, R 20 E, RACINE COUNTY, WISCONSIN

HORIZONTAL CONTROL SURVEY BY: NIELSEN & MADSEN ENGINEERS YEAR: 1970
VERTICAL CONTROL SURVEY BY: AERO-METRIC, INC. YEAR: 2000

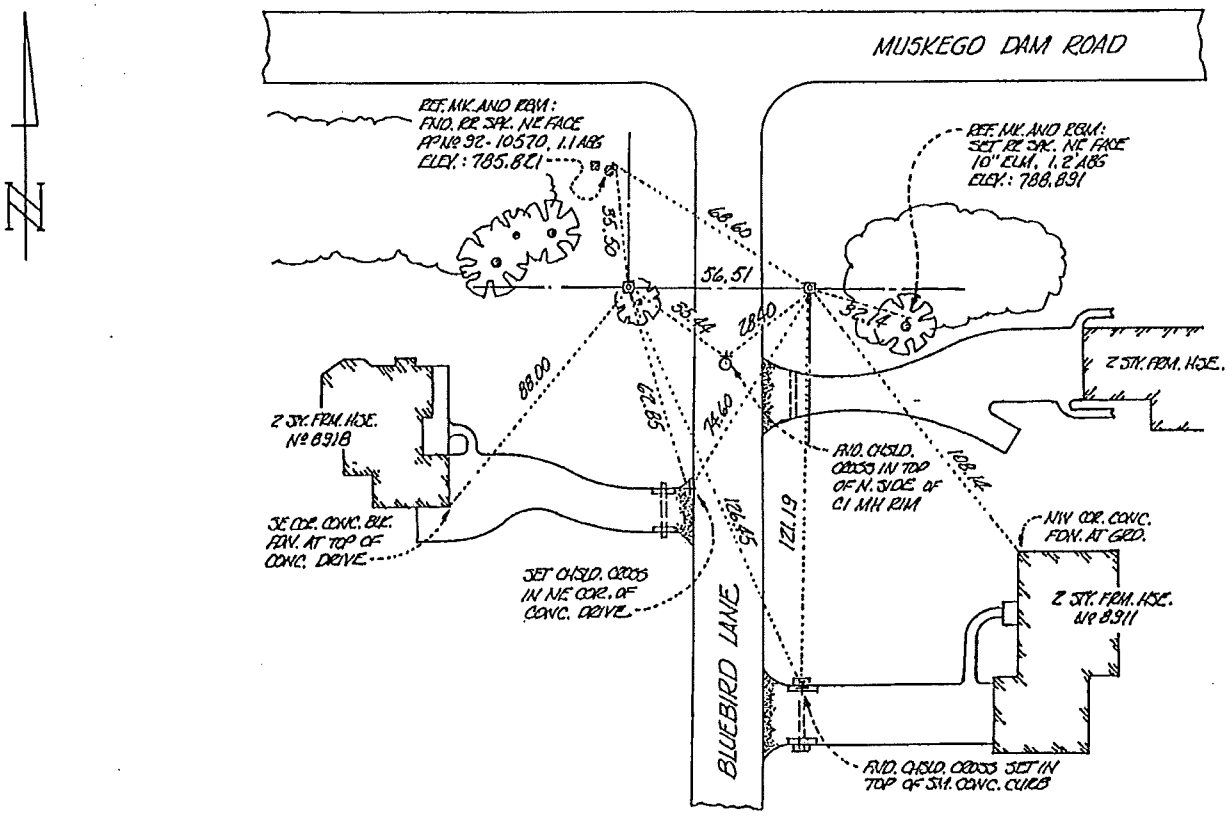
STATE PLANE COORDINATES OF: QUARTER SECTION CORNER
NORTH 312,679.16
EAST 2,493,827.61
ELEVATION OF STATION: 783.845

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE
NORTH AMERICAN DATUM OF 1927

VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929 THETA ANGLE: +01-15-55

CONTROL ACCURACY:
HORIZONTAL: THIRD ORDER, CLASS I VERTICAL: SECOND ORDER, CLASS II

LOCATION SKETCH:



SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN) SS
WAUKESHA COUNTY)

As Waukesha County Surveyor, I hereby certify that I found a cast iron monument with Racine County brass cap as set to mark this closing corner in June 1997 by Dennis W. Stephan, S-1262, Racine County Surveyor; said cast iron monument having replaced a cast iron monument with Racine County brass cap having been set to mark this corner in May 1972 by John H. Nielsen, S-338; said cast iron monument having been destroyed during subdivision development; said cast iron monument having been set by Mr. Nielsen on the township line as delineated between the south one-quarter corner, and the southeast corner of Section 32, in Township 5 North, Range 20 East, and both corners concerned having been marked at that time by cut limestone monuments, at a distance of 56.51 feet east of said south one-quarter corner, the location of the closing corner having been derived by the retracement of a real property boundary line description for an old public school lot, as recorded in the Racine County Register of Deeds Office-in Volume 838, page 460-the closing distance determined from information shown on the official plat of the U.S. Public Land Survey for Township 4 North, Range 20 East, dated May 1836 being 58.41 feet; that I have referenced the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN K. W. BAUER MILWAUKEE, WIS. REGISTERED LAND SURVEYOR

DATE OF SURVEY: 10 December 1999 Kurt W. Bauer S - 157
REGISTERED LAND SURVEYOR

FORM PREPARED BY SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

RACINE COUNTY, WISCONSIN
RECORD OF CONTROL SURVEY STATION

QUARTER SECTION CORNER $\frac{25}{36}\,|\,\frac{25}{36}$ TOWNSHIP 3 N, RANGE 21 E, RACINE COUNTY, WISCONSIN

GEODETIC SURVEY BY: NIELSEN & MADSEN CONSULTING ENGINEERS, RACINE WI. YEAR: 1974

STATE PLANE COORDINATES OF: QUARTER CORNER

NORTH 256,060.13

EAST 2,547,628.30

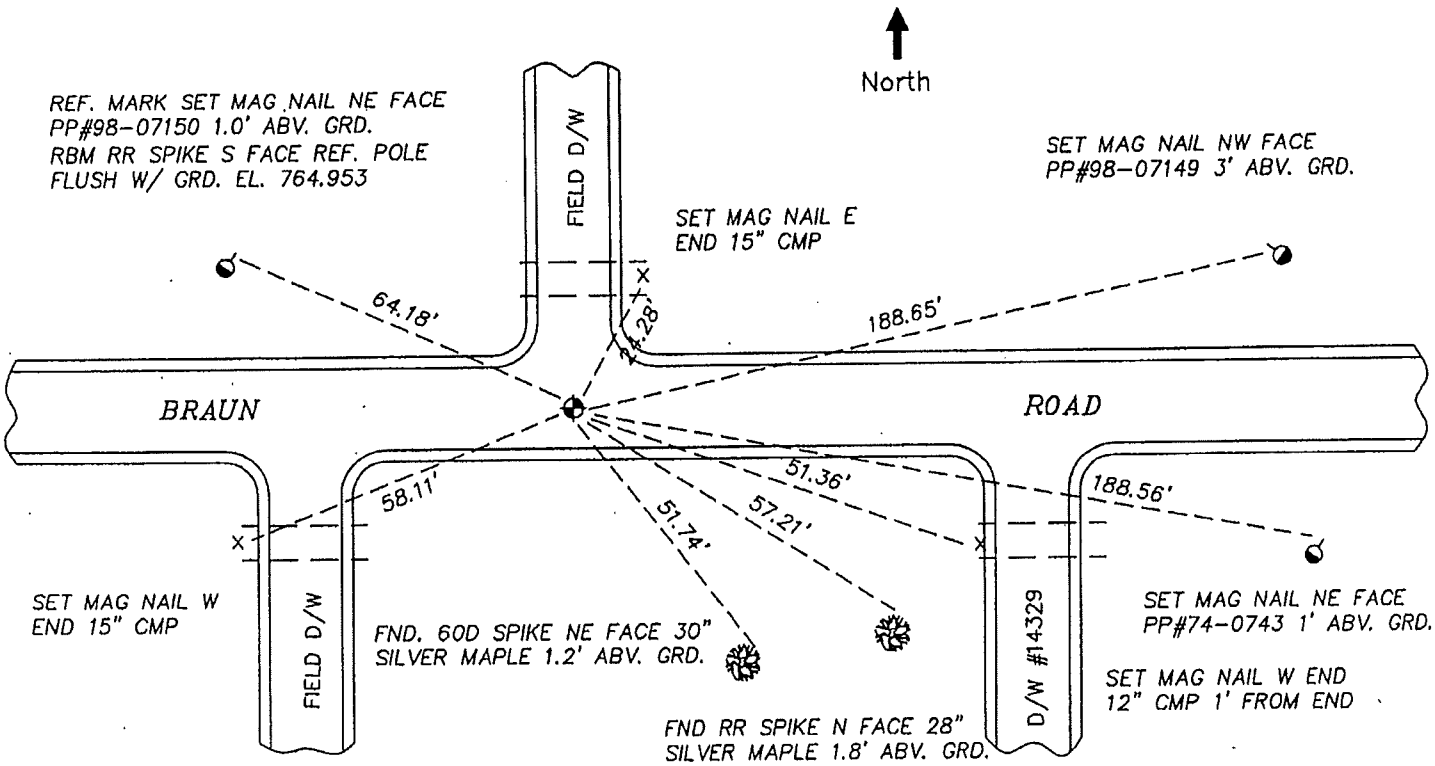
ELEVATION OF STATION 764.461 THETA ANGLE +01-23-58

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL AND VERTICAL CONTROL ACCURACY: SECOND ORDER

The corner is marked by a cast iron monument with a brass cap located 1/2 mile West of I-94.



Bearing N88-49-11E to the Northeast corner of Section 36

SURVEYOR'S AFFIDAVIT:
STATE OF WISCONSIN }SS
RACINE COUNTY

I found the cast iron monument I set on 12/4/74 that replaced a 3/4" diameter iron pipe found 2.0 feet beneath the surface which is the same location that in 1967 John H. Nielsen S-338 established at a point 24.75 feet North of a found rack bar on the South side of 60th Road, and I have referenced the same hereon.

WISCONSIN
DENNIS W. STEPHAN
S-1262
RACINE, WI
LAND SURVEYOR

Revised 12/16/03
DATE OF SURVEY 04/22/02 Dennis W. Stephan S- 1262 P- 132
REGISTERED LAND SURVEYOR

RACINE COUNTY, WISCONSIN
RECORD OF CONTROL SURVEY STATION

QUARTER SECTION CORNER 28/33 | 28/33 TOWNSHIP 4 N, RANGE 23 E, RACINE COUNTY, WISCONSIN

GEODETIC SURVEY BY: NIELSEN & MADSEN CONSULTING ENGINEERS, RACINE, WISCONSIN

STATE PLANE COORDINATES OF: Quarter Corner

NORTH 288,515.56

EAST 2,594,211.77

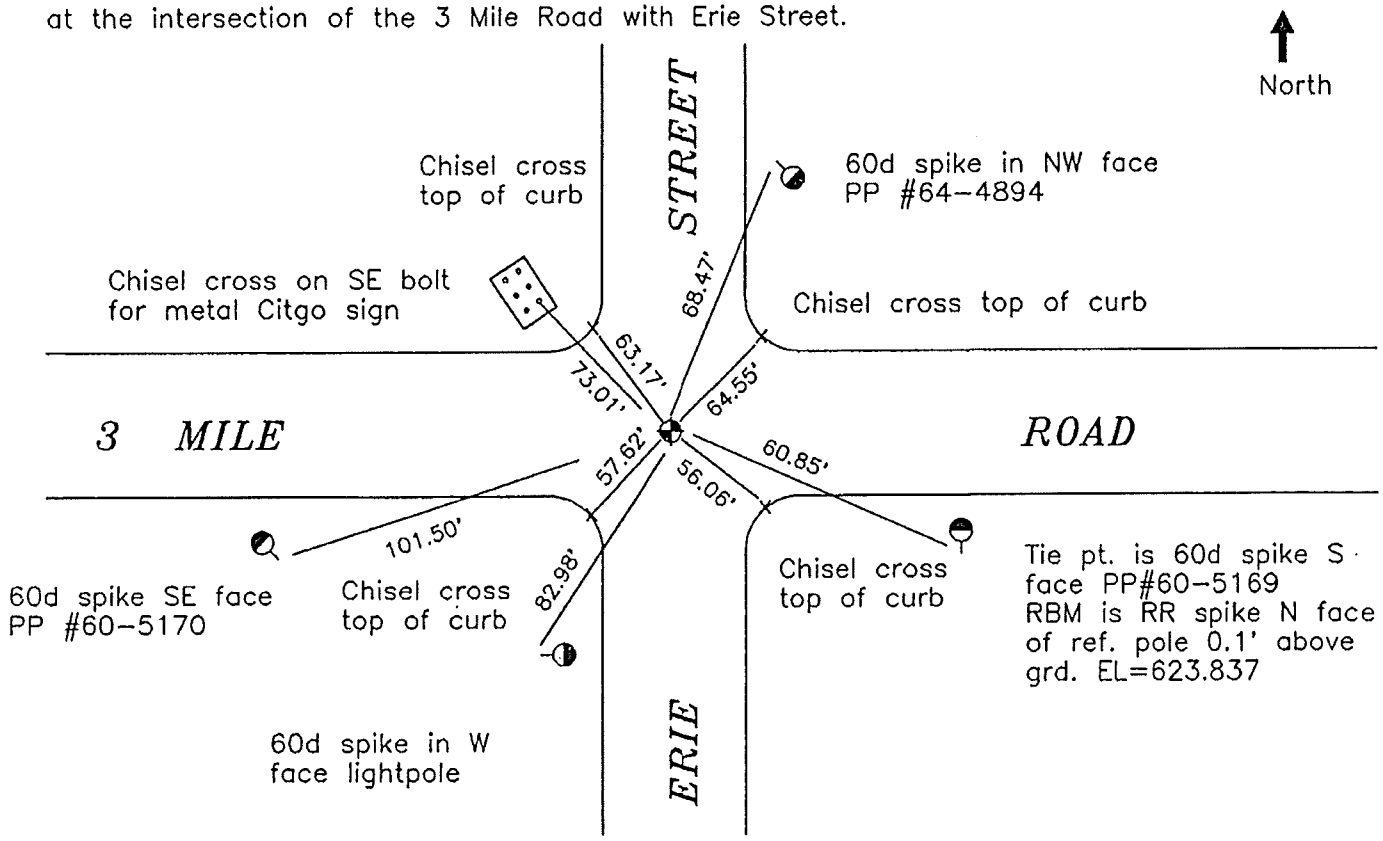
ELEVATION OF STATION 624.328 THETA ANGLE +01-31-14

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL AND VERTICAL CONTROL ACCURACY: SECOND ORDER

LOCATION SKETCH: The corner is marked by a cast iron monument with a brass cap loctaed at the intersection of the 3 Mile Road with Erie Street.



Bearing N88-36-32E to the Southeast corner of Section 28-4-23.

SURVEYOR'S AFFIDAVIT:
STATE OF WISCONSIN } SS
RACINE COUNTY

I found the cast iron monument with a brass cap set by John H. Nielsen (S-338) On 3/4/70 whose location was established by retracement from iron pipes found in the John H. Nielsen 1957 plat of Erie Terrace subdivision at which time Nielsen found a cut limestone monument marking the corner location.

WISCONSIN
DENNIS W. STEPHAN
S-1262
RACINE, WI
LAND SURVEYOR

DATE OF SURVEY 6/15/94 Dennis W. Stephan S- 1262 P- 138
REGISTERED LAND SURVEYOR

RECORD OF U. S. PUBLIC LAND SURVEY CONTROL STATION

U. S. PUBLIC LAND SURVEY CORNER 20|21 / 29|28 T 4 N, R 22 E, RACINE COUNTY, WISCONSIN

HORIZONTAL CONTROL SURVEY BY: NIELSEN & MADSEN, ENGINEERS YEAR: 1971
VERTICAL CONTROL SURVEY BY: SEWRPC YEAR: 2006

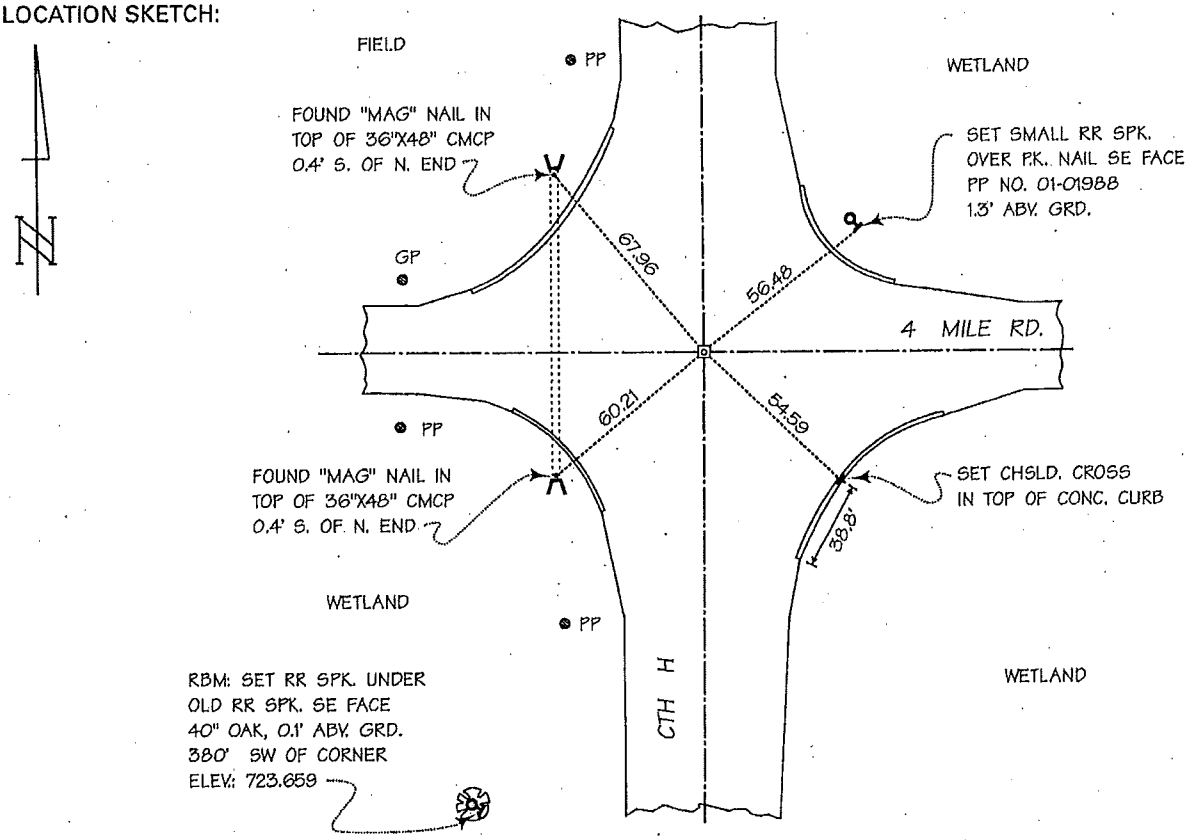
STATE PLANE COORDINATES OF: CENTER OF SECTION
NORTH 293,263.92
EAST 2,559,743.68
ELEVATION OF STATION: 719.602

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE
NORTH AMERICAN DATUM OF 1927

VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929 THETA ANGLE: +01-25-58

CONTROL ACCURACY:
HORIZONTAL: THIRD ORDER, CLASS I VERTICAL: SECOND ORDER, CLASS II

LOCATION SKETCH:



SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN) SS
WAUKESHA COUNTY)

I hereby certify that I found a concrete monument with WisDOT brass cap as set to mark this corner in 2001 by a consulting engineer to WisDOT under the direction and supervision of Dennis W. Stephan, S-1262, Racine County Surveyor, following highway reconstruction; replacing a cast iron monument with Racine County brass cap set to mark this corner in March 1971 by John H. Nielsen, S-338, Racine County Surveyor; replacing a cast iron plate with cross set in the bituminous pavement surface and a subsurface concrete monument with cast iron plug with cross then marking this corner, said monument having been set to mark this corner in September 1962 by F.W. Novak, State Highway Commission of Wisconsin Project Engineer, following highway reconstruction; replacing a railroad spike set in the bituminous pavement found marking this corner in early 1962 by Donald J. Renguette, S-557, Racine County Highway Engineer; that I referenced the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN
LELAND H. KREBLIN
S-1960
SUSSEX
WI
LAND SURVEYOR

DATE OF SURVEY: 19 APRIL 2006 Leland H. Kreblin S - 1960
REGISTERED LAND SURVEYOR

FORM PREPARED BY SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

RECORD OF U. S. PUBLIC LAND SURVEY CONTROL STATION

U. S. PUBLIC LAND SURVEY CORNER 20|21 / 29|28 T 2 N, R 19 E, RACINE/KENOSHA COUNTY, WISCONSIN

HORIZONTAL CONTROL SURVEY BY: NIELSEN & MADSEN YEAR: 1971
VERTICAL CONTROL SURVEY BY: SEWRPC YEAR: 2009

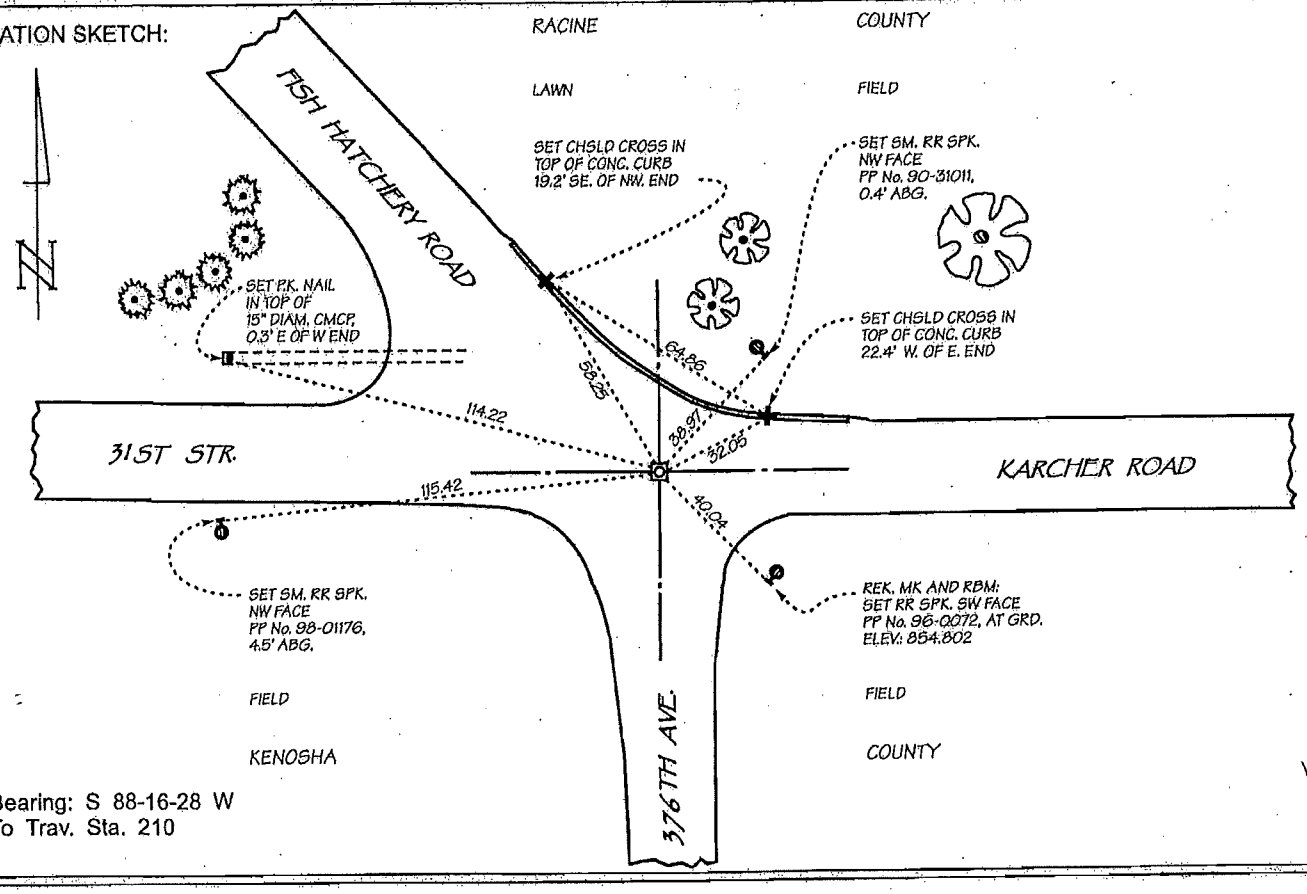
STATE PLANE COORDINATES OF: SECTION CORNER
NORTH 227,557.19
EAST 2,466,669.59
ELEVATION OF STATION: 856.234

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE
NORTH AMERICAN DATUM OF 1927

VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929 THETA ANGLE: +1-11-28

CONTROL ACCURACY:
HORIZONTAL: THIRD ORDER, CLASS I VERTICAL: SECOND ORDER, CLASS II

LOCATION SKETCH:



Bearing: S 88-16-28 W
To Trav. Sta. 210

SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN)
KENOSHA COUNTY) SS

As Kenosha County Surveyor, I hereby certify that following street resurfacing, I set a concrete monument with SEWRPC brass cap to mark the location of this corner; replacing a broken cast iron monument; said cast iron monument with Racine County brass cap having been set to mark the location of this corner in June 1971 by John H. Nielsen, S-338, former Racine County Surveyor, using recorded distances to witness marks maintained by the Racine County Highway Department to perpetuate the location of this corner; that I have referenced the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN K. W. BAUER MILWAUKEE, WIS. LAND SURVEYOR

DATE OF SURVEY: 7 OCTOBER 2008 Kurt W Bauer S - 157
REGISTERED LAND SURVEYOR

FORM PREPARED BY SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

RECORD OF U.S. PUBLIC LAND SURVEY CONTROL STATION

U S PUBLIC LAND SURVEY CORNER $\frac{33|34}{4|3}$ T $\frac{3}{2}$ N, R 20 E, KENOSHA COUNTY, WISCONSIN

GEODETIC SURVEY BY RACINE COR, ALSTER & ASSOC INC, ENGINEERS MADISON, WI (1969) YEAR
KENOSHA COR, KENOSHA COUNTY (HORIZ 1983), AERO-METRIC ENG, SHEBOYGAN, WI (VERT 1986)

STATE PLANE COORDINATES OF	SE COR SEC 33-3-20	NE COR SEC 4-2-20
NORTH	249,575 12	249,571 97
EAST	2,503,023 24	2,502,910 42
ELEVATION OF STATION	832 94	827 82

HORIZONTAL DATUM WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

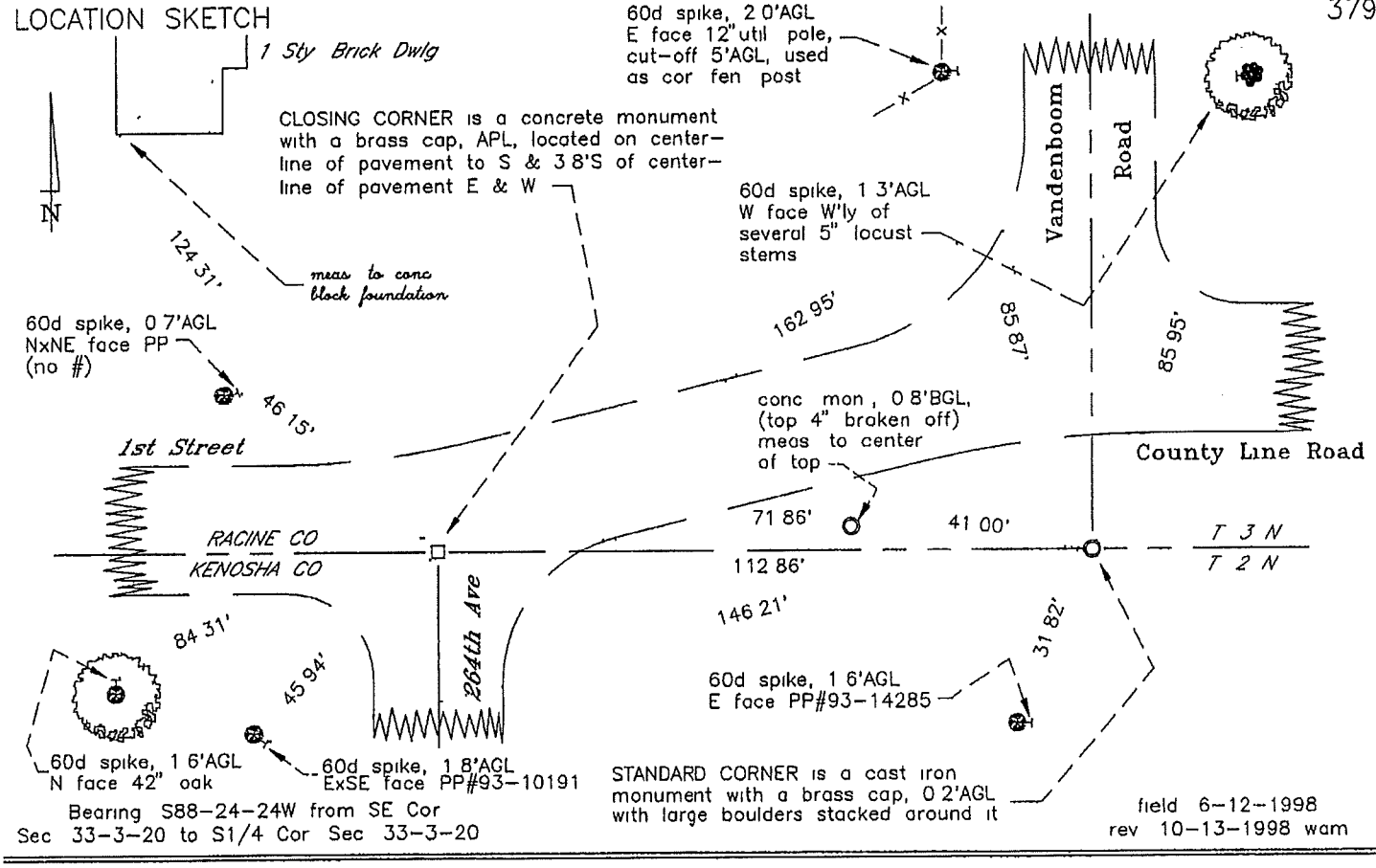
VERTICAL DATUM NATIONAL GEODETIC VERTICAL DATUM OF 1929

CONTROL ACCURACY THETA ANGLE +1-17-05

HORIZONTAL THIRD ORDER, CLASS I VERTICAL SECOND ORDER, CLASS II

LOCATION SKETCH

379



Bearing S88-24-24W from SE Cor Sec 33-3-20 to S1/4 Cor Sec 33-3-20

field 6-12-1998
rev 10-13-1998 wam

SURVEYOR'S AFFIDAVIT

STATE OF WISCONSIN } S S
KENOSHA COUNTY }

I hereby certify that I relocated and referenced the public land survey corner shown hereon In 1969, John H Nielsen (S-338) set a Racine County monument at a point replacing a 1/2" diameter iron pipe then marking this corner In 1983, County Surveyor, R L Smith (S-190) set a Kenosha County monument at a point on the town line, at the closing distance specified in the Government Survey field notes, from the standard corner as located and marked by the aforesaid J H Nielsen Both monuments were found to be in their original positions

WISCONSIN
WILLIAM A MARESCALCO
S-826
KENOSHA
WI
LAND SURVEYOR

DATE OF SURVEY 6-12-1998

[redacted]
REGISTERED LAND SURVEYOR

S - 826

Form designed by SEWRPC
Prepared by Kenosha County Surveyor

163

RECORD OF U. S. PUBLIC LAND SURVEY CONTROL STATION

U. S. PUBLIC LAND SURVEY CORNER 34|35 T 5 N, R 21 E, MILWAUKEE COUNTY, WIS.

GEODETIC SURVEY BY: AERO-METRIC ENGINEERING, INC. YEAR: 1993

STATE PLANE COORDINATES OF: SECTION CORNER

NORTH 313,946.54

EAST 2,538,726.21

ELEVATION OF STATION: 750.017

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929

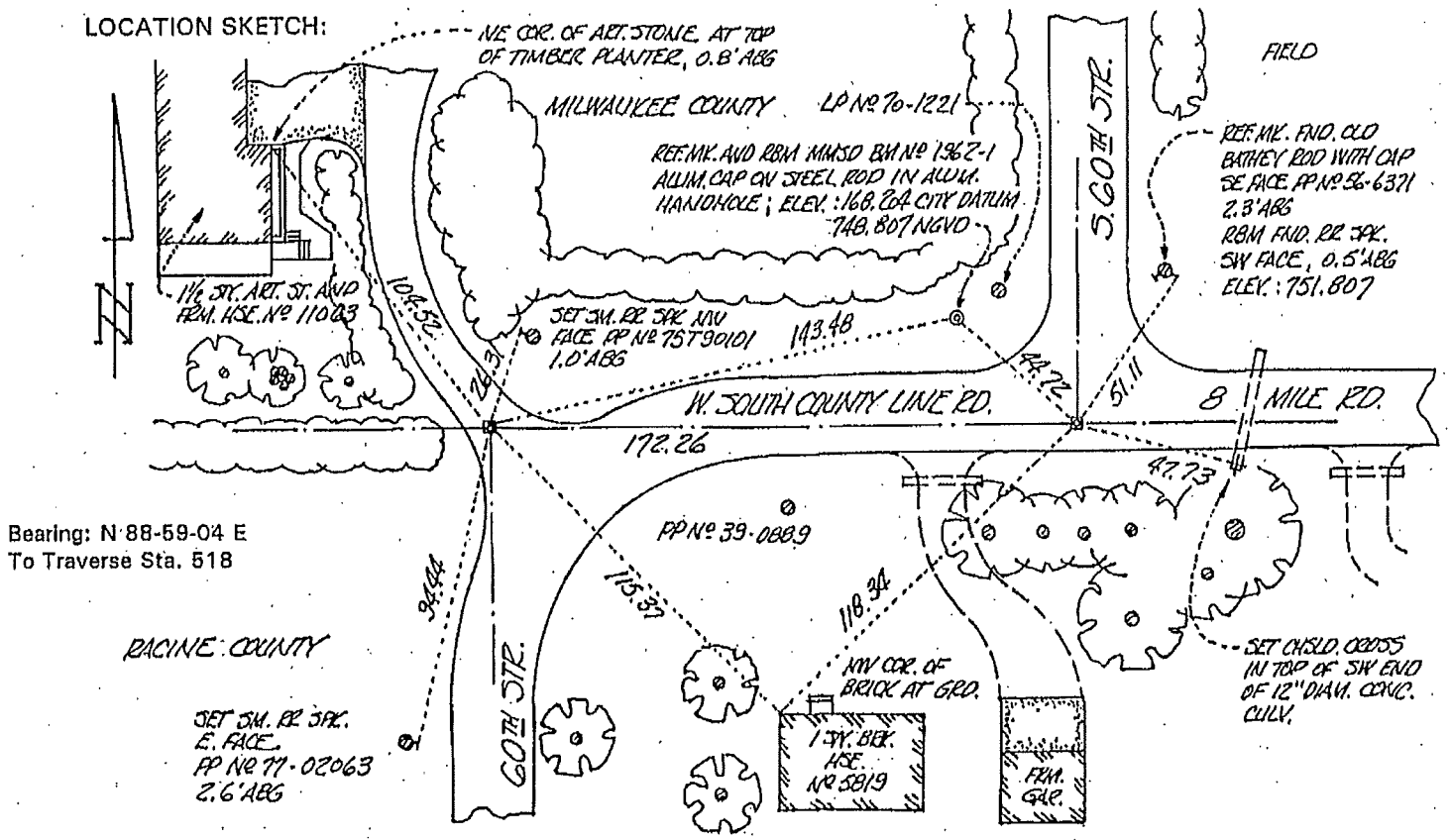
CONTROL ACCURACY:

HORIZONTAL: THIRD ORDER, CLASS I

THETA ANGLE: + 1-22-49

VERTICAL: SECOND ORDER; CLASS II

LOCATION SKETCH:



SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN)
SS
WAUKESHA COUNTY)

As County Surveyor, I hereby certify that I set a concrete monument with SEWRPC brass cap to mark this corner; replacing a broken concrete monument, said concrete monument with SEWRPC brass cap having been set to mark this corner in April 1965 by Sylvan J. Baudhuin, S-234; replacing a cut limestone monument set to mark this corner in 1878 by Jonathan C. Crounse, Surveyor; replacing in turn a wood post then marking this corner, the location of said wood post having been verified by ties to then still extant bearing trees, said wood post having been set to mark this corner in January 1836 by John Brink, Deputy United States Surveyor, in the conduct of the original United States Public Land Survey; that I referenced the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN K. W. BAUER MILWAUKEE, WIS. LAND SURVEYOR

DATE OF SURVEY: 21 April 1992

Kurt W. Bauer

S - 157

REGISTERED LAND SURVEYOR

FORM PREPARED BY SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

RECORD OF U. S. PUBLIC LAND SURVEY CONTROL STATION

U. S. PUBLIC LAND SURVEY CORNER $\frac{1|6}{1|6}$ T 3 N, R 18/19 E, WALWORTH/RACINE COUNTY, WISCONSIN

HORIZONTAL CONTROL SURVEY BY: NIELSEN & MADSEN, ENGINEERS YEAR: 1976
VERTICAL CONTROL SURVEY BY: OWEN AYRES & ASSOC., INC. YEAR: 2002

STATE PLANE COORDINATES OF: QUARTER SECTION CORNER
NORTH 277,345.50
EAST 2,464,553.53
ELEVATION OF STATION: 810.000

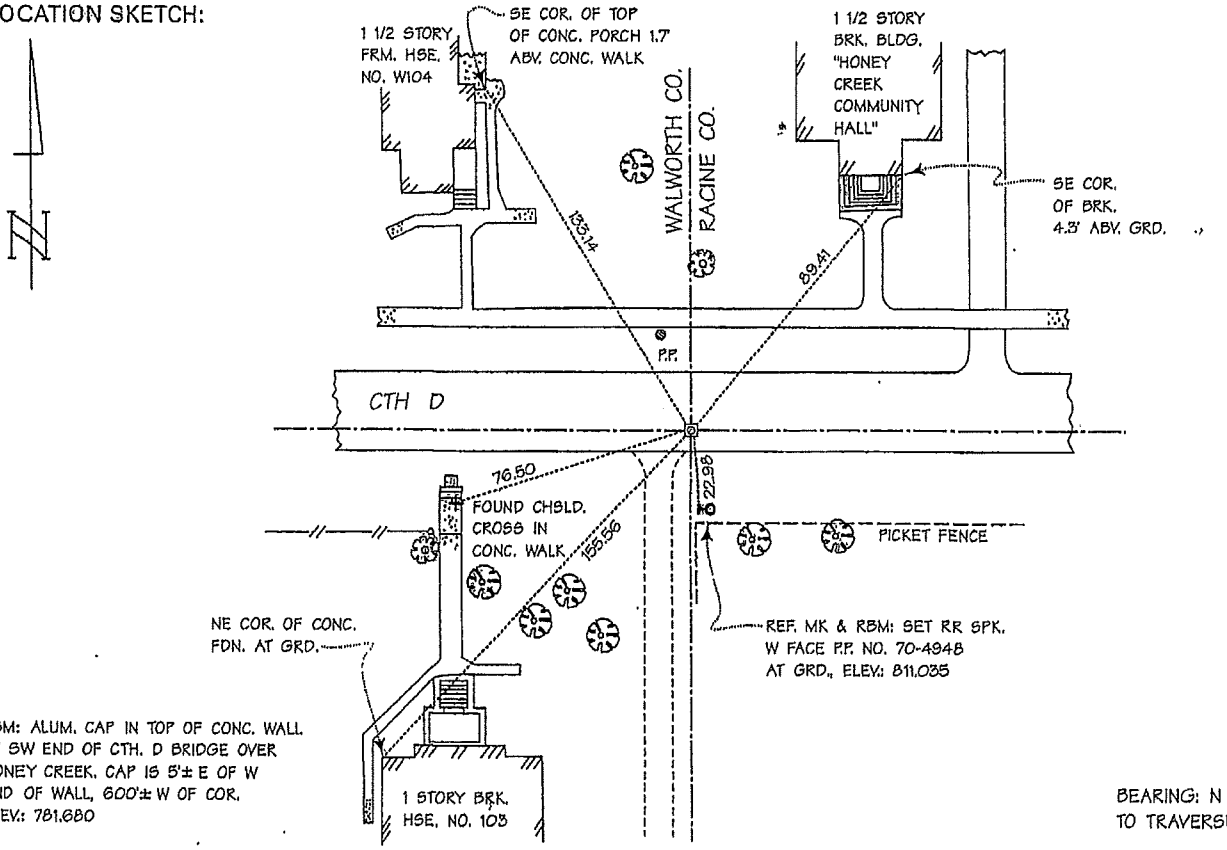
HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE
NORTH AMERICAN DATUM OF 1927

VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929

THETA ANGLE: +1-09-46

CONTROL ACCURACY:
HORIZONTAL: THIRD ORDER, CLASS I VERTICAL: SECOND ORDER, CLASS II

LOCATION SKETCH:



SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN)
WALWORTH COUNTY) SS

As Walworth County Surveyor, I hereby certify that I found a cast iron monument with Racine County brass cap in a cast iron frame as set to mark this corner in April 1976 by Dennis W. Stephan, S-1262; replacing an old, subsurface, cut limestone monument set to mark this corner in 1869 by Ira Sumner in the conduct of the remonumentation of the Town of Rochester; replacing a wood post set to mark this corner in the fall of 1835 by John Mullett, Deputy United States Surveyor, in the conduct of the original United States Public Land Survey; that I referenced the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN
LELAND H. KREBLIN
S-1960
SUSSEX
WI
LAND SURVEYOR

DATE OF SURVEY: 13 JUNE 2001 Leland H. Kreblin S - 1960
REVISED: 26 DECEMBER 2002 REGISTERED LAND SURVEYOR

FORM PREPARED BY SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

RACINE COUNTY, WISCONSIN
RECORD OF CONTROL SURVEY STATION

QUARTER SECTION CORNER 8/17 | 8/17 TOWNSHIP 4 N, RANGE 21 E, RACINE COUNTY, WISCONSIN

GEODETIC SURVEY BY NIELSEN & MADSEN CONSULTING ENGINEERS, RACINE, WISCONSIN

STATE PLANE COORDINATES OF: Quarter corner
NORTH 303,370.39
EAST 2,525,396.40

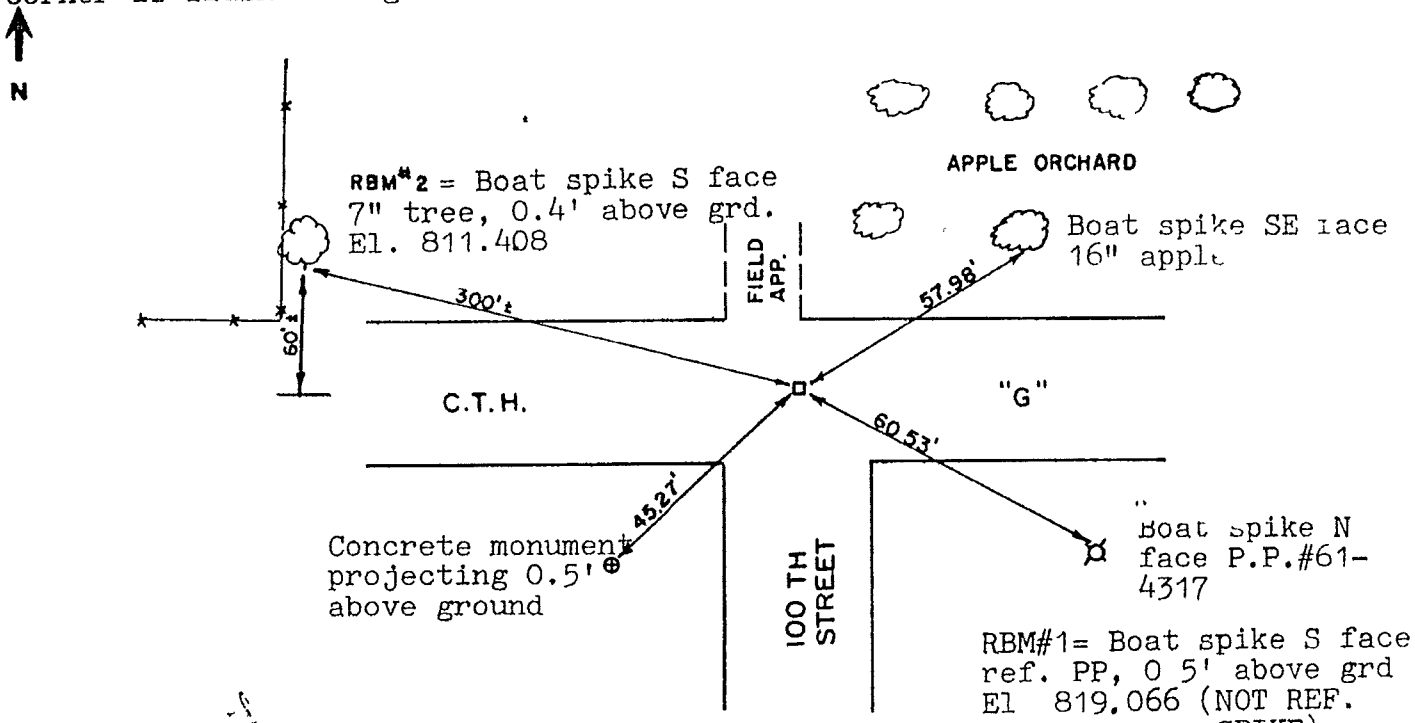
ELEVATION OF STATION 817.337 THETA ANGLE +01°20'44"

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL & VERTICAL CONTROL ACCURACY: SECOND ORDER

LOCATION SKETCH Corner is marked by a standard Racine County cast iron monument with a brass cap located at the intersection of C.T.H."G" and 100th Street. Corner is flush with ground.



Bearing N87°41'14"E to the Northeast corner of Section 17.

SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN } SS
RACINE COUNTY }

I HEREBY CERTIFY THAT in 1973 on our job NM73223 we found a railroad spike marking the location of this corner. On 1/8/75 we recovered same from reference ties taken in 1973.

DATE OF SURVEY 1/8/75
RE ISED 10/16, 78

Dennis W. Stephan
REGISTERED LAND SURVEYOR

S- 1262

62

RACINE COUNTY, WISCONSIN
RECORD OF CONTROL SURVEY STATION

QUARTER SECTION CORNER 23 | 24 / 26 | 25 TOWNSHIP 3 N, RANGE 21 E, RACINE COUNTY, WISCONSIN

GEODETIC SURVEY BY: NIELSEN & MADSEN ENGINEERS YEAR: 1974

STATE PLANE COORDINATES OF: Section Corner

NORTH 261,294.02

EAST 2,544,832.73

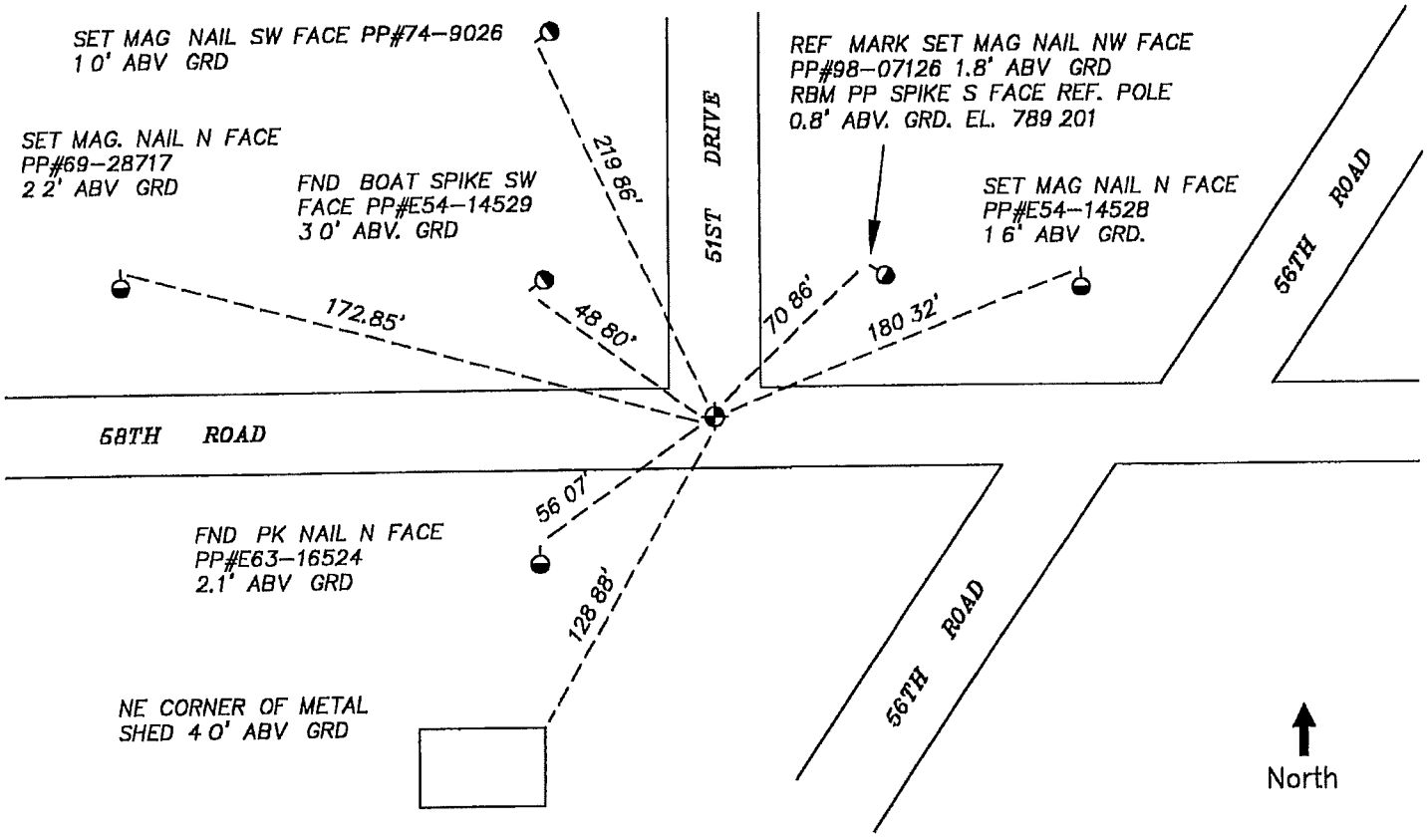
ELEVATION OF STATION 789.994 THETA ANGLE +01-23-34

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL AND VERTICAL CONTROL ACCURACY: SECOND ORDER

The corner is marked by a cast iron monument with a brass cap located 1 mile West of I-94.



Bearing S87-43-01W to the North 1/4 corner of Section 26

SURVEYOR'S AFFIDAVIT:
STATE OF WISCONSIN } SS
RACINE COUNTY

On 12/3/74 I set a cast iron monument with a brass cap from reference ties taken in 1964 and 1972 to a found 1" diameter iron pipe and a bent over railroad spike.
Said 12/3/74 monument was removed during road construction. On 8/8/00 I set a replacement cast iron monument with a brass cap at the 12/3/74 location and I have referenced the same hereon.

WISCONSIN
DENNIS W. STEPHAN
S-1262
RACINE, WI
LAND SURVEYOR

DATE OF SURVEY 8/8/00 Dennis W. Stephan S- 1262 P- 107
REGISTERED LAND SURVEYOR

RACINE COUNTY, WISCONSIN
RECORD OF CONTROL SURVEY STATION

QUARTER SECTION CORNER 23 | 24 / 26 | 25 TOWNSHIP 4 N, RANGE 21 E, RACINE COUNTY, WISCONSIN

GEODETIC SURVEY BY: NIELSEN & MADSEN ENGINEERS YEAR: 1974

STATE PLANE COORDINATES OF: Section corner

NORTH 293,135.59

EAST 2,544,125.54

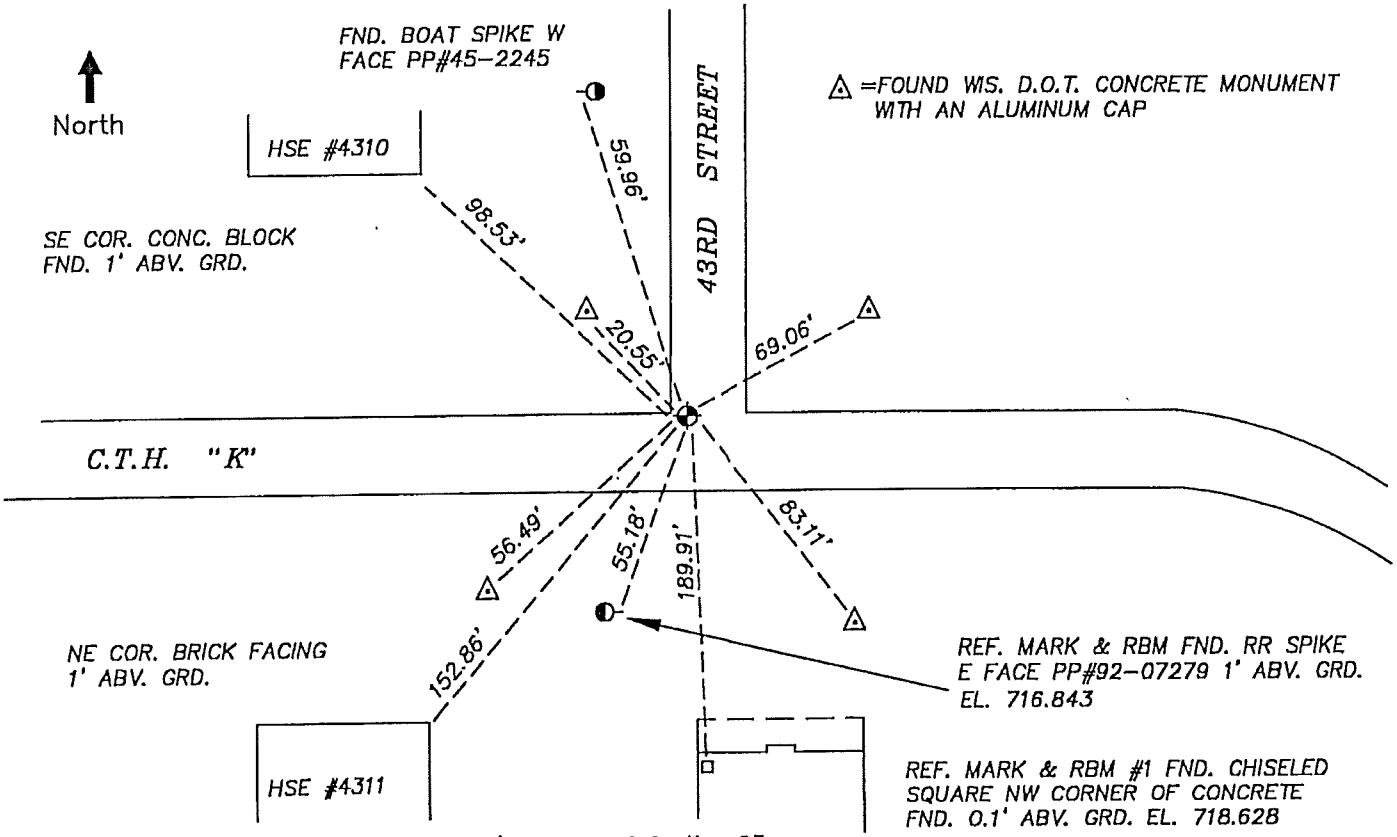
ELEVATION OF STATION 717.447 THETA ANGLE +01-23-34

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL AND VERTICAL CONTROL ACCURACY: SECOND ORDER

The corner is marked by a concrete monument woit a brass cap located 40'± norhtwesterly from the intersersection of C.T.H. "K" and 43rd Street and 1 mile West of I-94.



Bearing S89-09-19W to the South 1/4 corner of Section 23.

SURVEYOR'S AFFIDAVIT:
STATE OF WISCONSIN } SS
RACINE COUNTY

I found the concrete monument with a brass cap set by the Wisconsin D.O.T. personal durring 1999 road construction that replaced cast iron monument with a brass cap set by John H. Nielsen S-338 on 6/6/74 that replaced a found 1" iron pipe 0.9' beneath the surface from ties furnished by John F. Degen S-242, and I have referenced the same hereon.

WISCONSIN
DENNIS W. STEPHAN
S-1262
RACINE, WI
LAND SURVEYOR

DATE OF SURVEY 2/9/00 Dennis W. Stephan S- 1262 P- 107

REGISTERED LAND SURVEYOR

RECORD OF U.S. PUBLIC LAND SURVEY CONTROL STATION

U.S. PUBLIC LAND SURVEY CORNER 3 | 2 / 10 | 11 T. 4 N., R. 20 E. RACINE COUNTY, WISCONSIN

HORIZONTAL CONTROL SURVEY BY: NIELSEN MADSEN & BARBER, S.C. YEAR: 1970
VERTICAL CONTROL SURVEY BY: NIELSEN MADSEN & BARBER, S.C. YEAR: 2011

STATE PLANE COORDINATES OF: SECTION CORNER

NORTH 308,105.120

EAST 2,507,082.619

ELEVATION OF STATION 777.05

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NORTH AMERICAN DATUM OF 1927

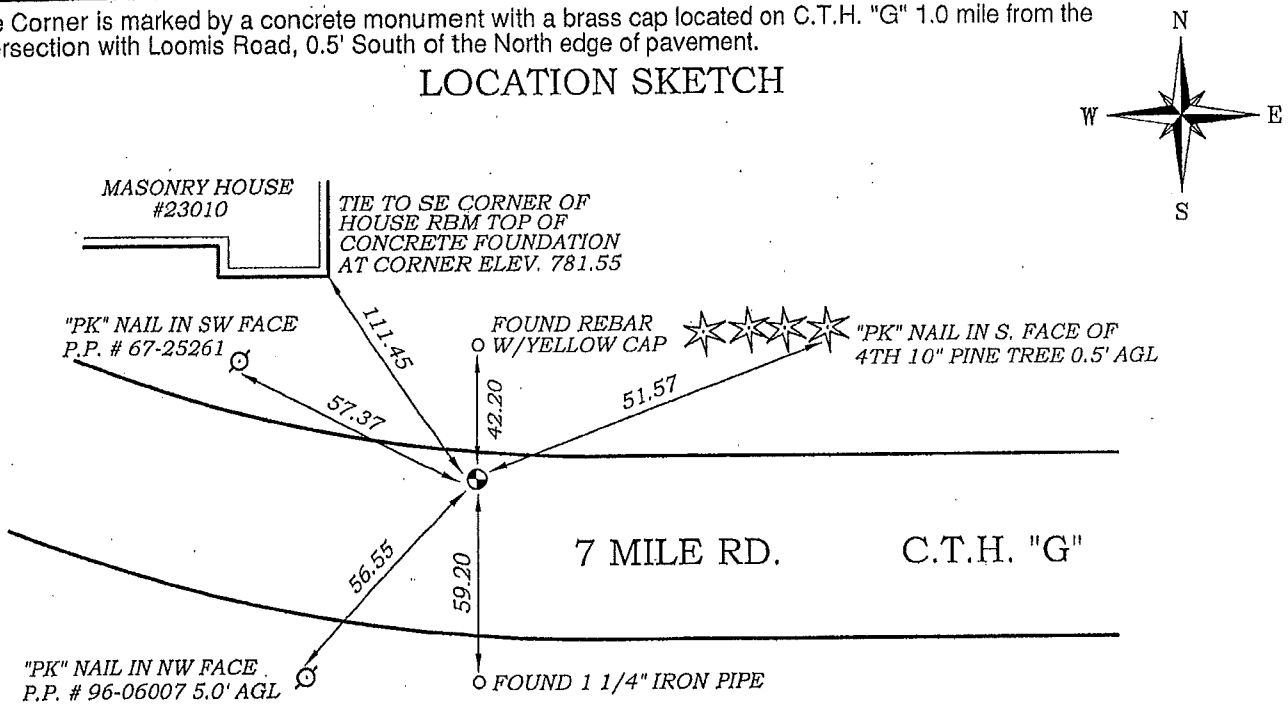
VERTICAL DATUM NATIONAL GEODETIC VERTICAL DATUM OF 1929

CONTROL ACCURACY:
HORIZONTAL: THIRD ORDER, CLASS I VERTICAL: SECOND ORDER, CLASS II

THETA ANGLE +1-17-56

The Corner is marked by a concrete monument with a brass cap located on C.T.H. "G" 1.0 mile from the intersection with Loomis Road, 0.5' South of the North edge of pavement.

LOCATION SKETCH



Field: 7-28-2010
Rev.

Bearing S89°54'30"E to traverse station #278

SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN } S.S.
RACINE COUNTY }

I hereby certify that I found a concrete monument with a brass cap set to mark the location of this corner following highway resurfacing which replaced a found cast iron monument with a brass cap which was set by John H. Nielsen, (S-338) in 1970; that I reference the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN
MARK R. MADSEN
S-2271
RACINE, WI
LAND SURVEYOR

DATE OF SURVEY: 7-28-2010

REGISTERED LAND SURVEYOR

S- 2271

Form designed by: SEWRPC
Prepared by: Nielsen Madsen & Barber, S.C.

RECORD OF U.S. PUBLIC LAND SURVEY CONTROL STATION

QUARTER SECTION CORNER $\frac{36}{1}\frac{31}{6}$ TOWN. 4 N, RANGE 20/21E, RACINE CO., WISC.

GEODETIC SURVEY BY: NIELSEN[3] & MADSEN

STATE PLANE COORDINATES OF: SECTION CORNER

NORTH 281,931.19

EAST 2,517,861.79

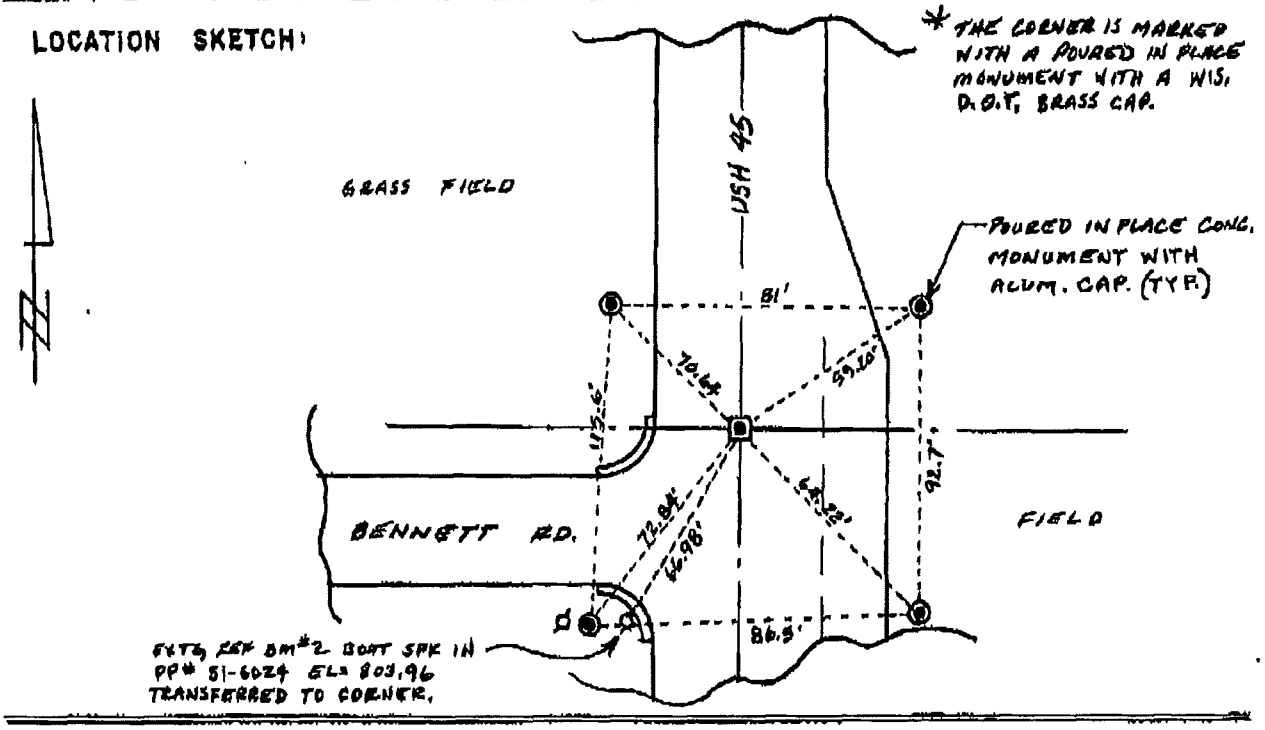
ELEVATION OF STATION: 802.85 THETA ANGLE: + 1°-19'-58"

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL & VERTICAL CONTROL ACCURACY: SECOND ORDER

LOCATION SKETCH:



SURVEYORS AFFIDAVIT:

STATE OF WISCONSIN)
_____ COUNTY) SS

I HEREBY CERTIFY THAT I FOUND THE REMNANT STEM FROM THE OLD CORNER, AND CAP. ONLY 1 TIE REMAINED, OTHERS WERE OBLITERATED. CONTACTED COUNTY SURVEYOR AND WAS INSTRUCTED TO PERPETUATE THE REMNANT STEM. I PERPETUATED SAID STEM PRIOR TO ROAD RE-SURFACING. AFTER ROAD CONSTRUCTION I RE-SET SAID POINT AND SUPPLEMENTED TIE WITH 4 POURED IN PLACE MONUMENTS AND TIED AS SHOWN HEREON

DATE OF SURVEY: 8/6/01 Todd A Reuss WIS. D.O.T. S- _____
[redacted] LAND SURVEYOR

RECORD OF U. S. PUBLIC LAND SURVEY CONTROL STATION

U. S. PUBLIC LAND SURVEY CORNER 9|10 / 16|15 T 4 N, R 20 E, RACINE COUNTY, WISCONSIN

HORIZONTAL CONTROL SURVEY BY: NIELSEN & MADSEN, ENGINEERS YEAR: 1970
VERTICAL CONTROL SURVEY BY: SEWRPC YEAR: 2006

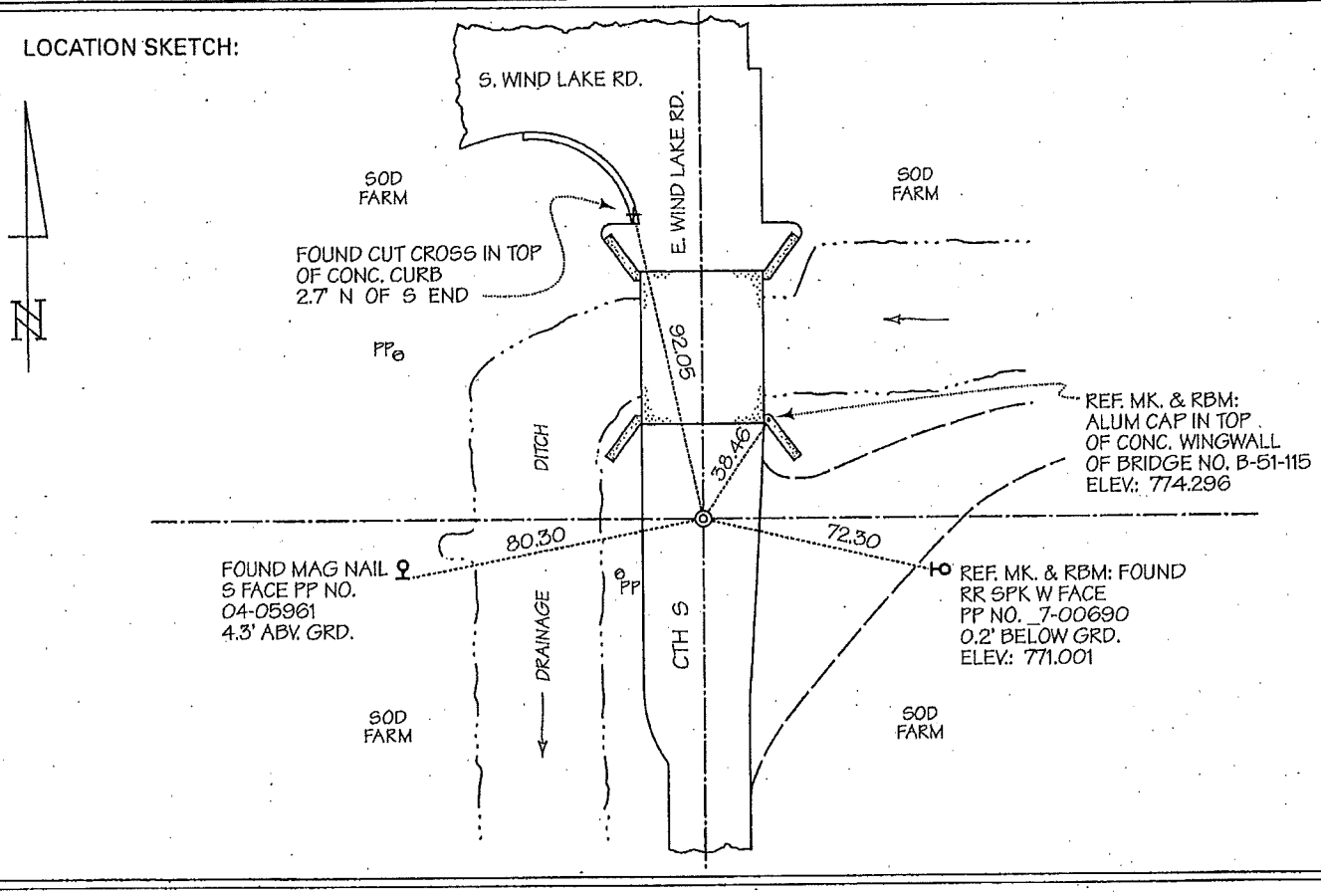
STATE PLANE COORDINATES OF: SECTION CORNER
NORTH 302,623.45
EAST 2,501,816.06
ELEVATION OF STATION: 774.609

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE
NORTH AMERICAN DATUM OF 1927

VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929 THETA ANGLE: +1-17-06

CONTROL ACCURACY:
HORIZONTAL: THIRD ORDER, CLASS I VERTICAL: SECOND ORDER, CLASS II

LOCATION SKETCH:



SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN)
WAUKESHA COUNTY) SS

I hereby certify that I found a concrete monument with WisDOT brass cap as set to mark this corner in November 2005 by a project engineer as a consultant to WisDOT, following bridge replacement; replacing a "P.K." nail set in the bituminous pavement to mark this corner in November 2005 by Frank T. Hueller, S-2434; replacing a cast iron monument with Racine County brass cap set to mark this corner in July 1970 by John H. Nielsen, S-338, Racine County Surveyor; replacing a railroad spike set in the pavement surface and a subsurface 0.5-inch-diameter iron pipe then marking this corner, said spike and pipe having been found by Mr. Nielsen to be located in agreement with ties to witness marks maintained by the Racine County Highway Department to perpetuate the location of this corner; that I referenced the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN
LELAND H. KREBLIN
S-1960
SUSSEX
WI
LAND SURVEYOR

DATE OF SURVEY: 19 MAY 2006 Leland H. Kreblin S - 1960
REGISTERED LAND SURVEYOR

FORM PREPARED BY SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

RECORD OF U. S. PUBLIC LAND SURVEY CONTROL STATION

U. S. PUBLIC LAND SURVEY CORNER 14|13 / 23|24 T 4 N, R 22 E, RACINE COUNTY, WISCONSIN

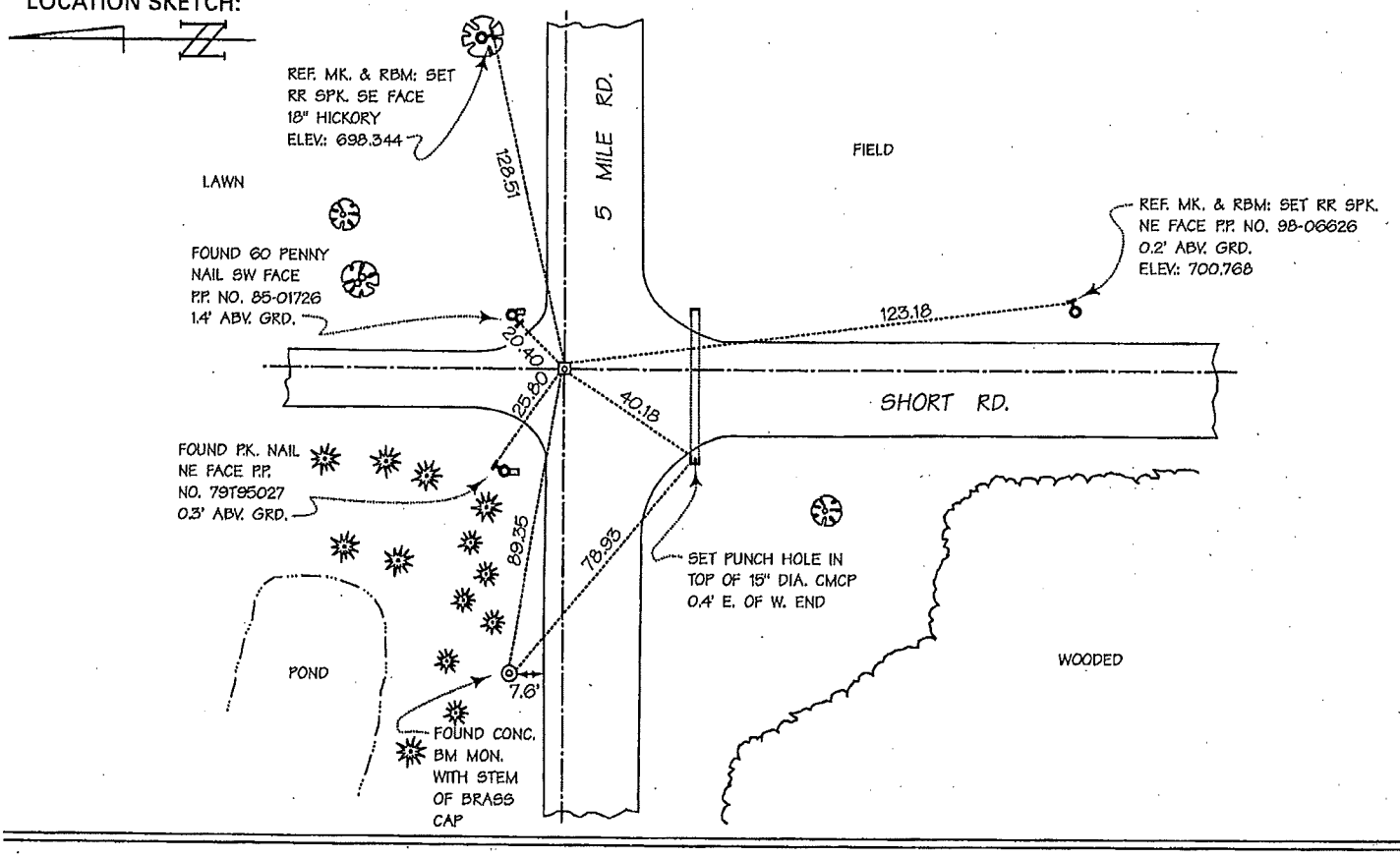
HORIZONTAL CONTROL SURVEY BY: ALSTER & ASSOCIATES, INC. YEAR: 1967
VERTICAL CONTROL SURVEY BY: AYRES ASSOCIATES/SEWRPC YEAR: 2005

STATE PLANE COORDINATES OF: SECTION CORNER
NORTH 298,670.75
EAST 2,575,537.20
ELEVATION OF STATION: 697.522

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE
NORTH AMERICAN DATUM OF 1927

VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM OF 1929
THETA ANGLE: +01-28-25
CONTROL ACCURACY:
HORIZONTAL: THIRD ORDER, CLASS I VERTICAL: SECOND ORDER, CLASS II

LOCATION SKETCH:



SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN)
WAUKESHA COUNTY) SS

I hereby certify that I found a concrete monument with Racine County brass cap as set to mark this corner in April 1967 by John H. Nielsen, S-338, Racine County Surveyor; replacing a subsurface field stone cairn then marking this corner; that I referenced the same as shown hereon; and that this record is correct and complete to the best of my knowledge and belief.

WISCONSIN
LELAND H. KREBLIN
S-1960
SUSSEX
WI
LAND SURVEYOR

DATE OF SURVEY: 15 FEBRUARY 2005 Leland H. Kreblin S - 1960
REGISTERED LAND SURVEYOR

FORM PREPARED BY SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

RACINE COUNTY, WISCONSIN
RECORD OF CONTROL SURVEY STATION

QUARTER SECTION CORNER 5/8 | 4/9 TOWNSHIP 4 N, RANGE 21 E, RACINE COUNTY, WISCONSIN

GEODETIC SURVEY BY NIELSEN & MADSEN CONSULTING ENGINEERS, RACINE, WISCONSIN

STATE PLANE COORDINATES OF: Section corner
NORTH 308,827.26
EAST 2,527,997.01

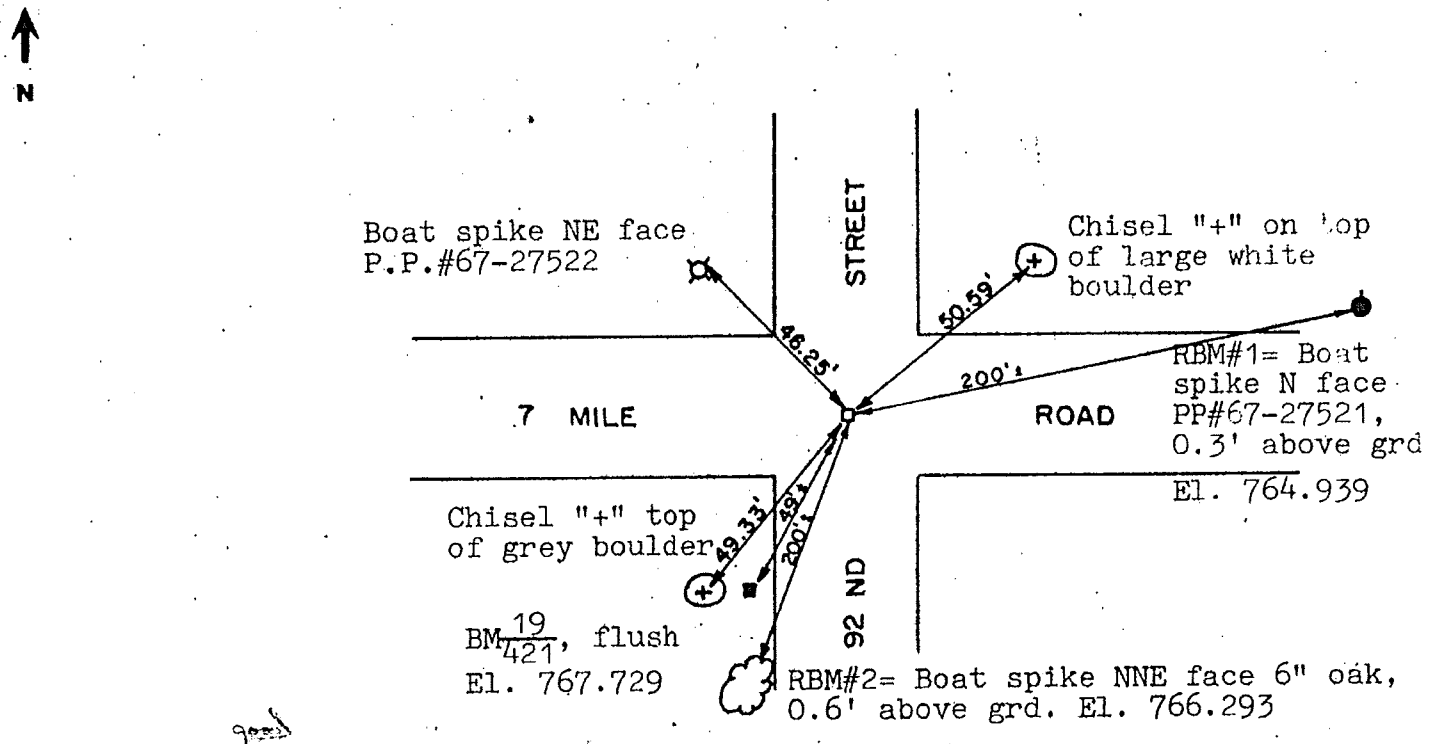
ELEVATION OF STATION 768.990 THETA ANGLE +01°21'09"

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL & VERTICAL CONTROL ACCURACY: SECOND ORDER

LOCATION SKETCH Corner is marked by a standard Racine County cast iron monument with a brass cap at the intersection of 7-Mile Road and 92nd St.



Bearing N00°12'55"W to the West ¼ corner of Section 4

SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN } SS
RACINE COUNTY }

I HEREBY CERTIFY THAT In 1969 our job NM69357, we set this corner by retracement from existing iron pipes found in place as recorded in Vol. 481, p.171, in the Office of the Register of Deeds for Racine County. On 1/9/75 we found a P.K. nail at the 1969 location.

DATE OF SURVEY 1/9/75
REVISED 10/16/78

Dennis W. Stephens
REGISTERED LAND SURVEYOR

S-1262

35

RACINE COUNTY, WISCONSIN
RECORD OF CONTROL SURVEY STATION

QUARTER SECTION CORNER 12 | 7 / 13 | 18 TOWNSHIP 3 N, RANGE 20/21 E, RACINE COUNTY, WISCONSIN

GEODETIC SURVEY BY: Nielsen & Madsen Consulting Engineers, Racine, Wisconsin

STATE PLANE COORDINATES OF: Section Corner

NORTH 271,204.26

EAST 2,518,192.32

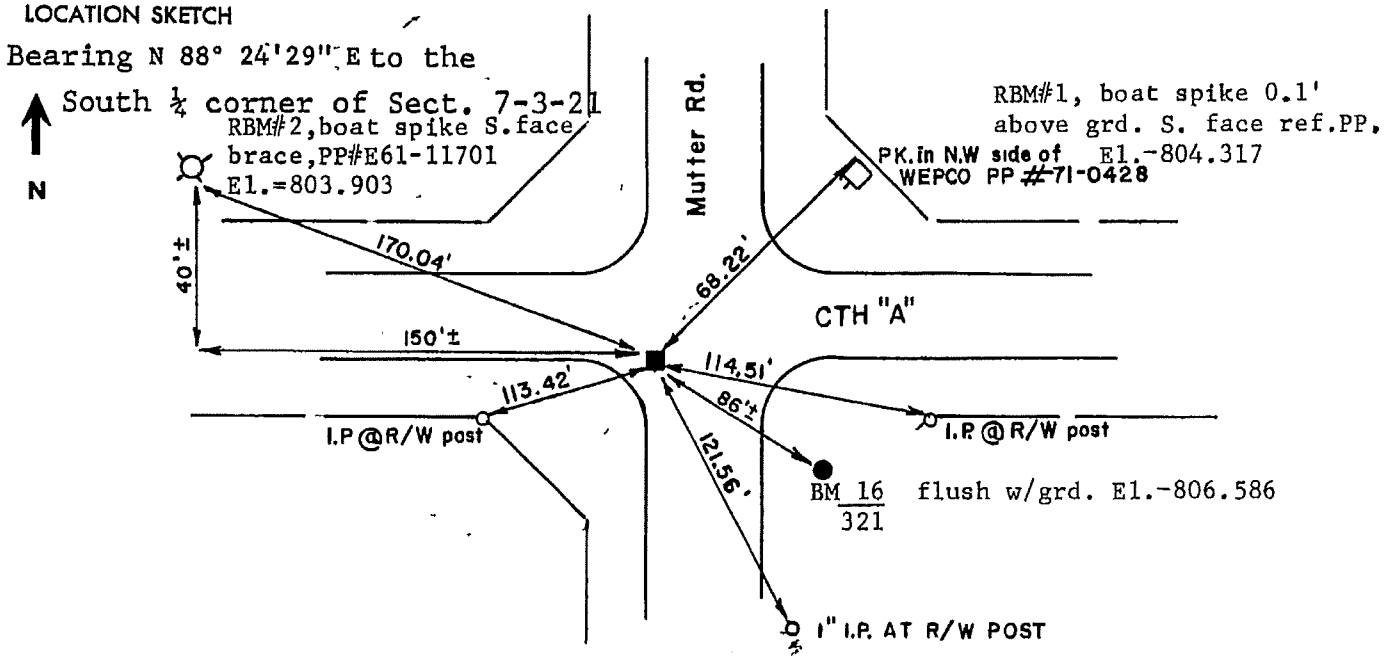
ELEVATION OF STATION 807.541 THETA ANGLE

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE REVISED 3/1/74 10/16/78 8/28/89 TIES

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL & VERTICAL CONTROL ACCURACY: SECOND ORDER

LOCATION SKETCH



The Section Corner is a cast iron monument with a brass cap, to reach, drive East on C.T.H. "A" 2.0 miles from the intersection with S.T.H. "75" to ~~Mutter Road~~ Raynor Road and corner location.

SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN } SS
RACINE COUNTY }

I HEREBY CERTIFY THAT the section corner was disturbed during construction of C.T.H. "A" and reset following completion of the construction project from ties on file in the County Highway Department Office.

DONALD E. ZENZ S-1088 Burlington, Wis. WISCONSIN LAND SURVEYOR

DATE OF SURVEY 9-14-72 Donald E. Zenz S — 1088

REGISTERED LAND SURVEYOR

RACINE COUNTY, WISCONSIN
RECORD OF CONTROL SURVEY STATION

QUARTER SECTION CORNER 5/8 | 4/9 TOWNSHIP 4 N, RANGE 21 E, RACINE COUNTY, WISCONSIN

GEODETIC SURVEY BY NIELSEN & MADSEN CONSULTING ENGINEERS, RACINE, WISCONSIN

STATE PLANE COORDINATES OF: Section corner
NORTH 308,827.26
EAST 2,527,997.01

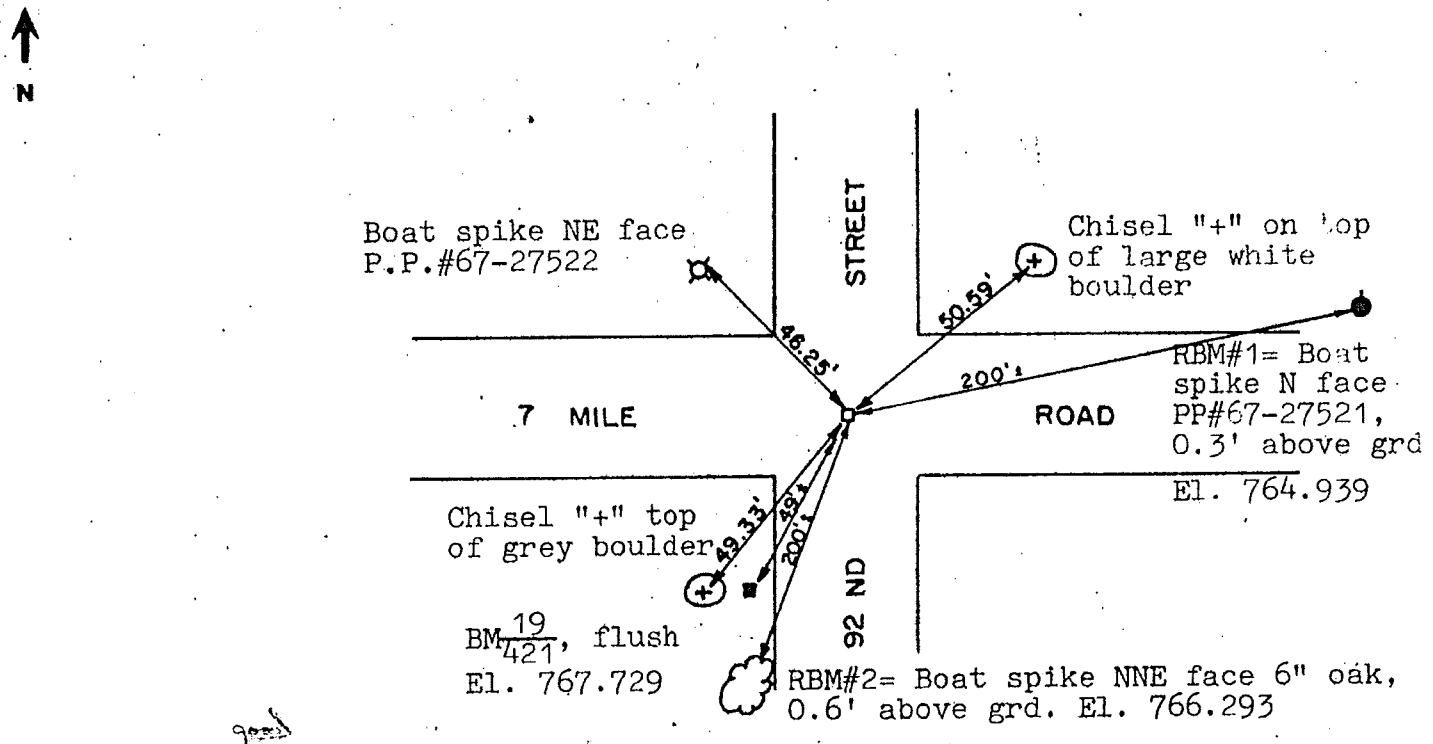
ELEVATION OF STATION 768.990 THETA ANGLE +01°21'09"

HORIZONTAL DATUM: WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE

VERTICAL DATUM: MEAN SEA LEVEL, 1929 ADJUSTMENT

HORIZONTAL & VERTICAL CONTROL ACCURACY: SECOND ORDER

LOCATION SKETCH Corner is marked by a standard Racine County cast iron monument with a brass cap at the intersection of 7-Mile Road and 92nd St.



Bearing N00°12'55"W to the West ¼ corner of Section 4

SURVEYOR'S AFFIDAVIT:

STATE OF WISCONSIN } SS
RACINE COUNTY }

I HEREBY CERTIFY THAT In 1969 our job NM69357, we set this corner by retracement from existing iron pipes found in place as recorded in Vol. 481, p.171, in the Office of the Register of Deeds for Racine County. On 1/9/75 we found a P.K. nail at the 1969 location.

DATE OF SURVEY 1/9/75
REVISED 10/16/78

Dennis W. Stephens
REGISTERED LAND SURVEYOR

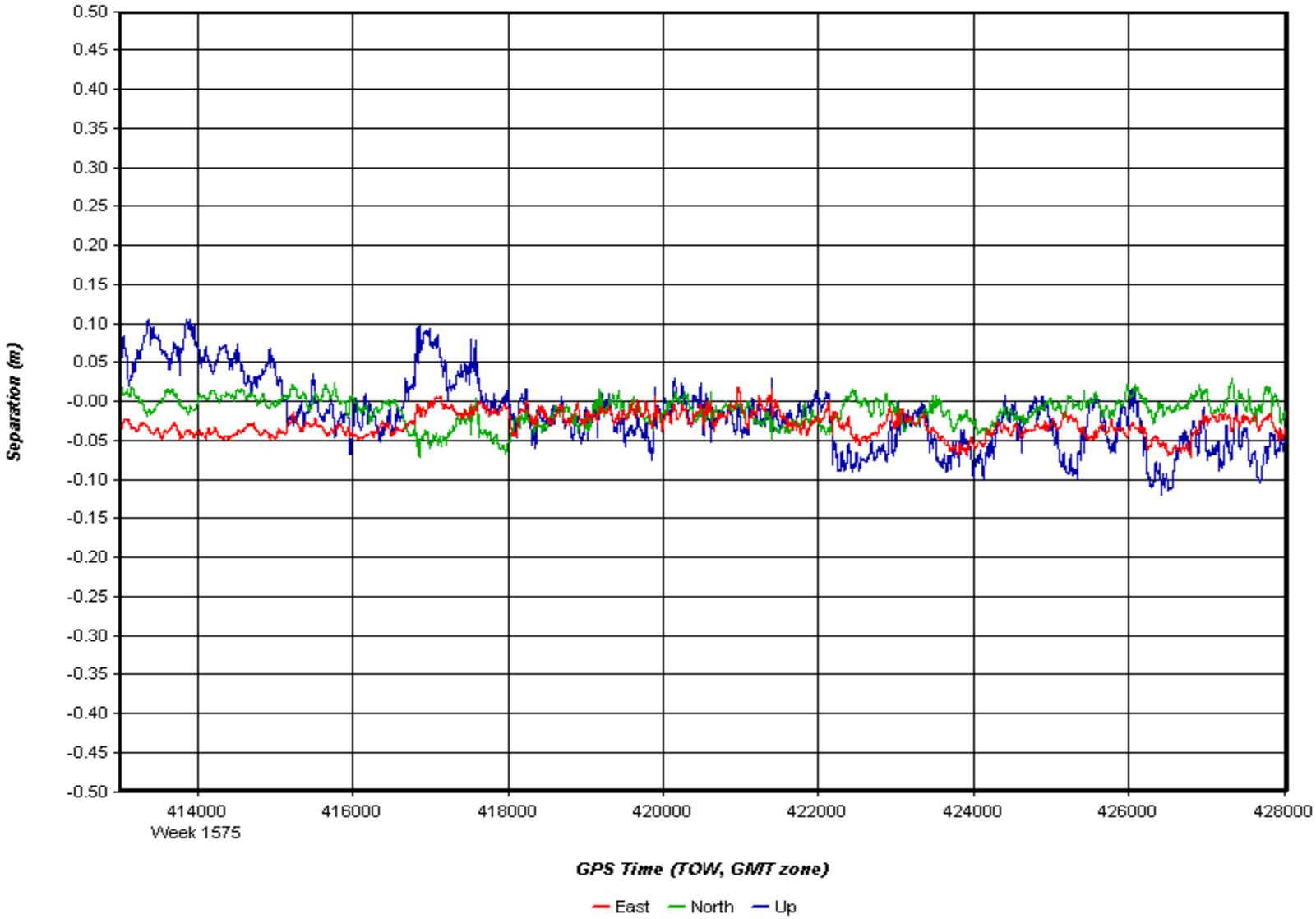
S-1262

35

4. Airborne GPS Processing Separation Plots

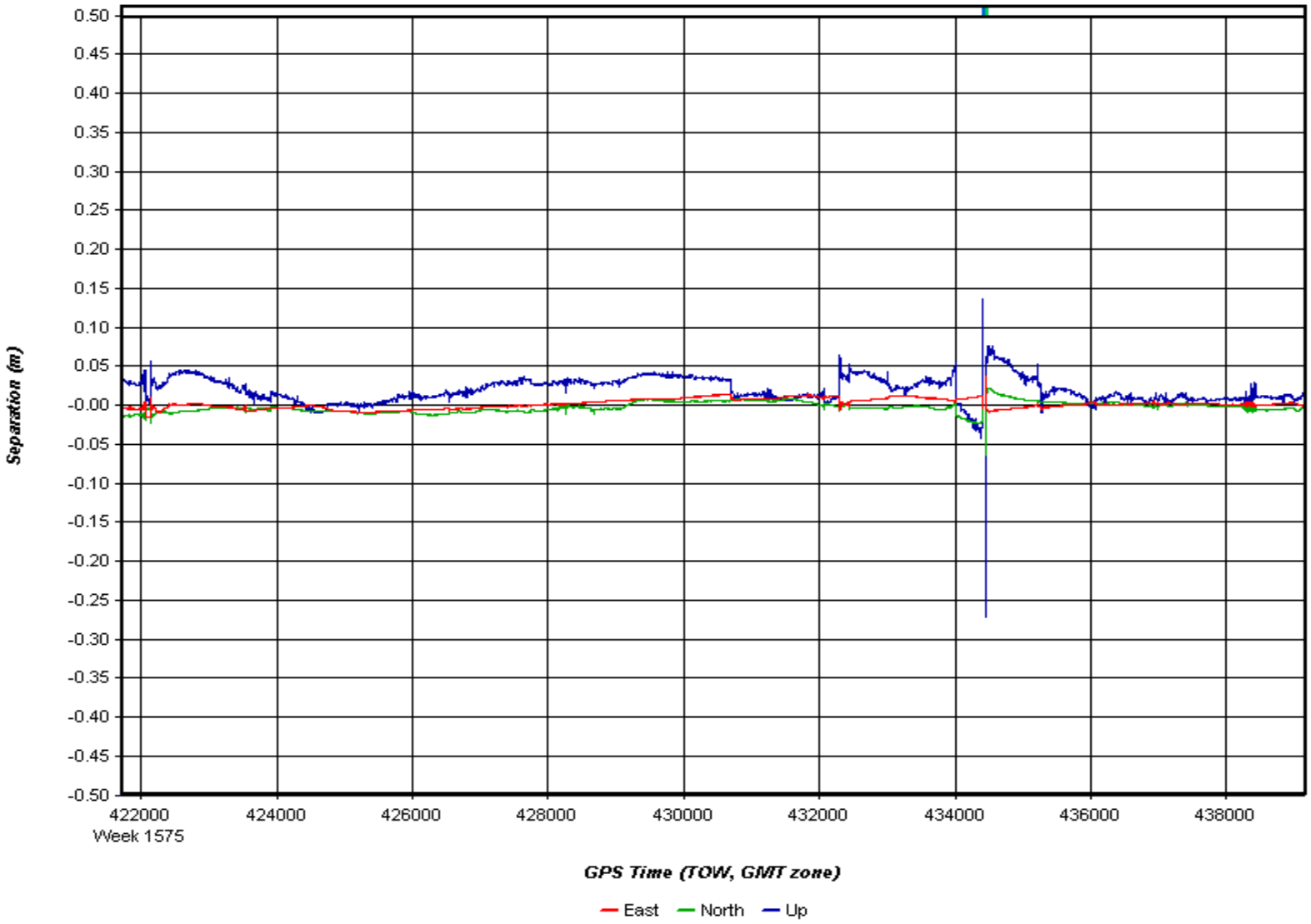
Separation Plot

03-18-10



Separation Plot

03-18-10



Separation Plot

03-18-10