

Mapping & Survey Quality Control Report for:

SCI 823-Middle
PID 19415

Report Submitted by:
ODOT/Office of Aerial Engineering
04.02.2012

Mapping Performed by:
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Mapping Checked by:
Rachel Lewis, P.E.

Control Collected by:
District 9 Survey/Aerial Engineering

The above parties certify the mapping furnished with this project meets the requirements of the ODOT Mapping Specifications, dated **July 15, 2011**.

General Comments

Attached is the quality control report for the mapping and survey work for this project.

The mapping was compiled for design engineering use.

Project control is not included with this report.

Datum and Coordinate Systems

Vertical

Orthometric Height Datum: NAVD88

Geoid Model: GEOID09

Horizontal

Coordinate System: Ohio State Plane, South Zone

Map Projection: Lambert Conformal Conic

Reference Frame: NAD83(CORS96)

Ellipsoid: GRS80

Combined Scale Factor: 1.0000000000

Units

All units are US Survey Feet.

Digital Terrain Model

Methodology & Equipment Used

Check points were collected using ODOT VRS.

Survey points were collected using an Airborne LiDAR sensor with GPS/IMU navigation system.

The entire DTM was vertically adjusted to the Check Points by: -0.143 feet

DTM Accuracy Class A – Paved Surfaces

Average Dz: +0.027'

RMSE 0.125'

DTM Accuracy Class C – Vegetated Surfaces

Average Dz: +0.312'

RMSE 0.349'

Data Used for Statistical Analysis is attached.

Additional DTM Notes:

- Project is mapped for DTM Accuracy Class A on the pavement and DTM Accuracy Class C off of the pavement.
- Check points VRS325 and VRS327 were removed from the analysis due to unusually high Dz values which made them statistical outliers. These shots were located in a heavily wooded area which may have resulted in a high PDOP.
- LiDAR check points marked as outside are located outside of the mapping boundary and therefore were not included in the analysis.
- All subsurface drainage, ditch inverts, or channel inverts require field collection and inclusion into the furnished existing surface model.
- Areas with dense brush or heavy vegetation require field collection and inclusion into the existing surface model.
- Retaining walls and bridges require field collection and inclusion into the existing surface model.
- All bridges, other large drainage structures (such as box culverts and large headwalls), standing water bodies (such as lakes, ponds, or flooded areas at the time of flight), rivers, and perennial streams are delivered as voids within the DTM. Intermittent drainage channels (such as highway ditches and small streams) were not voided for the DTM and are included within the surface model.

Digital Mapping

Methodology & Equipment Used

Check points were collected using RTK ODOT VRS.

Survey points were collected using digital camera with a GPS/IMU navigation system, aerotriangulation, and Photogrammetric 3D stereo planimetric collection.

Planimetric Horizontal Accuracy Class I

RMSE Easting = 0.218'

RMSE Northing = 0.288'

Data Used for Statistical Analysis is attached.

Additional Digital Mapping Notes:

- Project is mapped for Planimetric Accuracy Class I.
- All subsurface utilities require field collection.

Data:

DTM Accuracy Class A Survey Points & Check Points

Point ID	Point Easting	Point Northing	Check Point Elevation	Survey Elevation	Dz	Dz^2
LC001	1859625.900	311209.154	634.176	634.060	-0.116	0.013
LC002	1859621.985	311206.193	634.191	634.130	-0.061	0.004
LC003	1859618.100	311203.160	634.109	634.160	0.051	0.003
LC004	1859613.723	311199.772	634.089	634.170	0.081	0.007
LC005	1859609.151	311196.222	634.080	634.180	0.100	0.010
LC006	1859604.426	311192.550	634.152	634.150	-0.002	0.000
LC007	1859598.753	311188.225	634.183	634.050	-0.133	0.018
LC008	1859593.462	311184.013	634.187	633.990	-0.197	0.039
LC009	1859586.948	311179.105	634.206	633.960	-0.246	0.061
LC010	1859581.708	311174.906	634.297	634.010	-0.287	0.082
LC011	1859575.056	311169.755	634.330	634.270	-0.060	0.004
LC012	1859568.330	311164.587	634.367	634.450	0.083	0.007
LC013	1859561.680	311159.458	634.454	634.380	-0.074	0.005
LC014	1859555.519	311154.576	634.473	634.430	-0.043	0.002
LC015	1859549.290	311149.730	634.542	634.570	0.028	0.001
LC016	1859544.913	311146.405	634.527	634.550	0.023	0.001
LC017	1859540.238	311142.572	634.562	634.600	0.038	0.001
LC018	1859535.359	311138.869	634.573	634.720	0.147	0.022
LC019	1859531.070	311135.623	634.663	634.780	0.117	0.014
LC020	1859526.999	311132.476	634.655	634.780	0.125	0.016
LC021	1859522.666	311129.087	634.741	634.840	0.099	0.010
LC022	1859518.036	311125.439	634.846	634.900	0.054	0.003
LC023	1859513.121	311121.581	634.884	634.950	0.066	0.004
LC024	1859507.660	311117.490	634.911	634.980	0.069	0.005
LC025	1859503.331	311114.077	634.960	634.830	-0.130	0.017
LC026	1859498.112	311110.081	635.004	635.000	-0.004	0.000
LC027	1859491.504	311105.071	635.121	635.100	-0.021	0.000
LC028	1859481.246	311096.986	635.196	635.030	-0.166	0.028
LC029	1859474.429	311091.711	635.208	635.490	0.282	0.080
LC030	1859468.977	311087.519	635.284	635.360	0.076	0.006
VRS101	1854809.833	314201.318	716.200	716.150	-0.050	0.003
VRS102	1854832.668	314215.870	716.100	715.920	-0.180	0.032
VRS103	1854855.141	314230.114	715.890	716.100	0.210	0.044
VRS104	1854879.105	314245.376	715.720	715.900	0.180	0.032

VRS105	1854905.508	314262.194	715.750	715.830	0.080	0.006
VRS106	1854930.842	314278.290	715.680	715.790	0.110	0.012
VRS107	1854957.171	314294.952	715.550	715.580	0.030	0.001
VRS108	1854981.937	314310.864	715.430	715.560	0.130	0.017
VRS109	1855006.480	314326.555	715.420	715.480	0.060	0.004
VRS110	1855031.900	314342.943	715.350	715.410	0.060	0.004
VRS111	1854861.565	314246.321	715.940	716.000	0.060	0.004
VRS112	1854855.153	314255.052	715.810	715.800	-0.010	0.000
VRS113	1854851.730	314259.653	715.160	715.500	0.340	0.116
VRS114	1854843.211	314272.258	715.190	715.230	0.040	0.002
VRS115	1854826.241	314299.730	714.570	714.550	-0.020	0.000
VRS116	1854809.557	314325.788	713.760	713.740	-0.020	0.000
VRS117	1854792.777	314351.817	712.850	712.780	-0.070	0.005
VRS118	1854776.339	314376.698	712.470	712.370	-0.100	0.010
VRS119	1854760.700	314401.105	712.630	712.650	0.020	0.000
VRS120	1854752.636	314397.079	712.670	712.690	0.020	0.000
VRS130	1854809.230	314226.728	715.960	716.140	0.180	0.032
VRS131	1854814.578	314216.654	716.170	716.280	0.110	0.012
VRS132	1854820.938	314207.598	715.990	716.070	0.080	0.006
VRS133	1854822.594	314205.175	715.920	715.890	-0.030	0.001
VRS134	1852836.110	316069.046	782.900	outside	*	*
VRS135	1852836.125	316069.069	782.920	outside	*	*
VRS136	1852862.493	316059.557	785.170	785.470	0.300	0.090
VRS137	1852894.763	316047.943	787.820	788.130	0.310	0.096
VRS138	1852925.971	316036.052	790.560	790.840	0.280	0.078
VRS139	1852953.357	316025.026	792.760	792.870	0.110	0.012
VRS140	1852981.735	316014.492	795.050	795.280	0.230	0.053
VRS141	1853003.893	316006.437	796.530	796.780	0.250	0.063
VRS142	1853031.933	315995.909	798.510	798.650	0.140	0.020
VRS143	1853060.412	315985.281	800.240	800.380	0.140	0.020
VRS144	1853063.611	315993.767	800.850	800.940	0.090	0.008
VRS150	1853006.104	316013.701	796.920	796.980	0.060	0.004
VRS151	1853008.129	316020.396	796.960	796.940	-0.020	0.000
VRS159	1856875.348	315250.227	731.940	731.990	0.050	0.003
VRS160	1856846.312	315237.716	732.150	732.250	0.100	0.010
VRS161	1856819.398	315226.158	732.340	732.440	0.100	0.010
VRS162	1856791.079	315213.818	732.420	732.500	0.080	0.006
VRS163	1856760.242	315200.363	732.600	732.600	0.000	0.000

VRS164	1856730.754	315187.499	732.640	732.620	-0.020	0.000
VRS165	1856702.581	315175.127	732.630	732.640	0.010	0.000
VRS166	1856667.117	315159.685	732.530	732.480	-0.050	0.003
VRS172	1856671.330	315150.320	732.570	732.710	0.140	0.020
VRS173	1856675.019	315141.201	732.360	732.440	0.080	0.006
VRS180	1855855.733	317495.287	942.010	outside	*	*
VRS181	1855855.578	317522.775	941.900	outside	*	*
VRS182	1855862.704	317549.672	940.690	outside	*	*
VRS183	1855875.463	317574.494	938.950	outside	*	*
VRS184	1855892.147	317597.241	937.050	outside	*	*
VRS185	1855911.963	317618.057	935.220	outside	*	*
VRS186	1855933.261	317636.626	933.350	outside	*	*
VRS187	1855955.940	317652.952	931.280	outside	*	*
VRS188	1855872.666	317585.360	938.800	outside	*	*
VRS189	1855866.525	317590.640	938.650	outside	*	*
VRS194	1858651.153	315627.371	704.950	outside	*	*
VRS195	1858648.568	315666.457	705.490	outside	*	*
VRS196	1858644.314	315695.848	706.250	outside	*	*
VRS201	1858653.417	315697.341	706.540	outside	*	*
VRS202	1858661.030	315698.663	706.480	outside	*	*
VRS207	1858744.026	315707.584	711.400	outside	*	*
VRS208	1858639.584	315726.240	707.450	outside	*	*
VRS209	1858634.520	315754.546	708.840	outside	*	*
VRS210	1858629.252	315782.810	710.010	outside	*	*
VRS211	1858623.916	315811.873	711.040	outside	*	*
VRS212	1858618.472	315841.266	712.180	outside	*	*
VRS213	1856201.905	310114.890	651.300	outside	*	*
VRS214	1856173.826	310107.900	651.580	outside	*	*
VRS215	1856145.882	310101.759	652.070	outside	*	*
VRS216	1856124.649	310097.885	652.280	outside	*	*
VRS217	1856099.665	310094.139	652.670	outside	*	*
VRS218	1856076.586	310092.146	653.030	outside	*	*
VRS219	1856048.722	310090.352	653.310	outside	*	*
VRS220	1856019.025	310089.877	653.430	outside	*	*
VRS221	1855989.697	310090.857	653.650	outside	*	*
VRS222	1855959.776	310093.534	653.920	outside	*	*
VRS223	1856108.481	310094.932	652.620	outside	*	*
VRS224	1856109.292	310082.716	652.270	outside	*	*

VRS225	1856111.469	310055.782	652.100	outside	*	*
VRS226	1856114.348	310027.847	652.380	outside	*	*
VRS227	1856116.467	309996.884	652.680	outside	*	*
VRS228	1858588.098	310650.930	641.790	outside	*	*
VRS229	1858615.215	310662.945	641.370	outside	*	*
VRS230	1858641.446	310674.587	641.090	outside	*	*
VRS231	1858668.306	310686.184	641.210	outside	*	*
VRS232	1858695.007	310697.352	641.390	outside	*	*
VRS233	1858722.177	310708.401	641.380	outside	*	*
VRS234	1858748.578	310718.797	641.490	outside	*	*
VRS235	1858776.469	310729.053	641.310	outside	*	*
VRS236	1858803.487	310738.480	641.170	outside	*	*
VRS237	1858842.377	310728.586	640.100	outside	*	*
VRS238	1858839.413	310739.854	640.660	outside	*	*
VRS239	1858836.739	310749.401	640.890	outside	*	*
VRS245	1859812.388	311722.299	640.660	outside	*	*
VRS251	1859820.066	311726.725	640.830	outside	*	*
VRS252	1859827.779	311731.044	640.570	outside	*	*
VRS259	1859799.063	311747.546	641.580	outside	*	*
VRS260	1859784.367	311772.171	642.540	outside	*	*
VRS261	1859768.048	311802.421	643.940	outside	*	*
VRS262	1859754.972	311830.063	645.850	outside	*	*
VRS263	1859740.595	311855.753	648.090	outside	*	*
VRS264	1859726.490	311881.980	650.770	outside	*	*
VRS265	1862234.794	311891.839	631.710	outside	*	*
VRS266	1862208.705	311908.661	632.720	outside	*	*
VRS267	1862181.987	311924.883	633.690	outside	*	*
VRS268	1862155.559	311939.213	634.750	outside	*	*
VRS269	1862127.409	311951.866	635.820	outside	*	*
VRS270	1862097.869	311962.281	636.670	outside	*	*
VRS271	1862068.294	311970.170	637.570	outside	*	*
VRS272	1862038.472	311975.782	638.170	outside	*	*
VRS273	1862008.739	311979.348	638.450	outside	*	*
VRS274	1861978.940	311981.227	638.910	outside	*	*
VRS275	1861948.606	311982.074	639.340	outside	*	*
VRS279	1859649.311	302632.015	711.890	outside	*	*
VRS280	1859639.105	302635.692	712.130	outside	*	*
VRS281	1859629.384	302639.289	711.420	outside	*	*

VRS287	1859648.617	302664.295	712.400	outside	*	*
VRS288	1859658.313	302693.059	712.570	outside	*	*
VRS289	1859667.397	302720.739	712.830	outside	*	*
VRS290	1859676.672	302749.014	713.160	outside	*	*
VRS291	1859686.202	302777.736	713.140	outside	*	*
VRS292	1859629.230	302606.256	712.100	outside	*	*
VRS293	1859619.364	302576.274	711.930	outside	*	*
VRS294	1859609.569	302548.308	711.790	outside	*	*
VRS295	1859599.053	302519.220	711.760	outside	*	*
VRS296	1861842.379	305384.000	717.400	outside	*	*
VRS297	1861866.009	305399.062	715.520	outside	*	*
VRS298	1861889.588	305414.002	713.760	outside	*	*
VRS299	1861914.197	305429.720	712.060	outside	*	*
VRS300	1861937.820	305444.707	710.490	outside	*	*
VRS301	1861963.284	305461.055	709.220	outside	*	*
VRS302	1861988.385	305477.155	708.370	outside	*	*
VRS303	1862012.567	305492.860	707.900	outside	*	*
VRS304	1862036.448	305508.336	707.400	outside	*	*
VRS305	1862062.441	305525.180	706.300	outside	*	*
VRS306	1862066.977	305518.075	706.310	outside	*	*
VRS307	1862070.006	305513.882	705.890	outside	*	*
VRS308	1862080.848	305495.896	705.610	outside	*	*
VRS309	1862093.395	305474.168	705.660	outside	*	*
VRS310	1862107.149	305451.593	705.910	outside	*	*
VRS311	1862122.428	305428.347	706.310	outside	*	*
VRS312	1864228.848	304683.378	796.050	outside	*	*
VRS313	1864232.295	304690.841	796.090	outside	*	*
VRS325	1866256.387	304896.436	685.550	removed	*	*
VRS326	1866305.191	304913.164	681.660	681.620	-0.040	0.002
VRS327	1866330.483	304923.414	680.910	removed	*	*
VRS338	1867307.743	309082.503	633.180	outside	*	*
VRS339	1867300.783	309110.999	632.320	outside	*	*
VRS340	1867293.894	309138.473	631.340	outside	*	*
VRS341	1867286.959	309166.906	630.670	outside	*	*
VRS342	1867279.856	309196.624	629.860	outside	*	*
VRS343	1867272.687	309227.290	628.950	outside	*	*
VRS344	1867265.933	309256.254	628.090	outside	*	*
VRS345	1867259.191	309284.959	627.160	outside	*	*

VRS346	1867252.325	309314.990	626.100	outside	*	*
VRS347	1867245.276	309345.867	624.980	outside	*	*
VRS348	1867238.950	309374.095	624.150	outside	*	*
VRS349	1867231.797	309406.664	623.050	outside	*	*
VRS350	1867225.181	309438.780	622.080	outside	*	*
VRS351	1867217.727	309475.877	620.970	outside	*	*
VRS353	1867322.057	309114.619	632.760	outside	*	*
VRS354	1867310.199	309114.518	632.780	outside	*	*
VRS355	1867297.041	309110.382	631.960	outside	*	*
VRS356	1867268.544	309103.877	633.220	outside	*	*
VRS357	1867246.014	309098.873	635.770	outside	*	*
VRS358	1867232.229	309095.971	635.910	outside	*	*
VRS359	1867198.772	309086.330	636.120	outside	*	*
VRS360	1867170.363	309073.925	638.390	outside	*	*
VRS361	1857580.842	307694.432	663.940	outside	*	*
VRS362	1857577.597	307726.701	663.900	outside	*	*
VRS363	1857572.579	307758.631	664.100	outside	*	*
VRS364	1857567.012	307789.978	663.940	outside	*	*
VRS365	1857561.472	307818.906	663.820	outside	*	*
VRS366	1857554.994	307850.186	663.830	outside	*	*
VRS367	1857547.905	307881.913	663.780	outside	*	*
VRS368	1857540.244	307914.790	663.790	outside	*	*
VRS369	1857532.714	307944.761	664.140	outside	*	*
VRS370	1857523.983	307977.698	664.300	outside	*	*
VRS371	1857514.112	308010.133	664.310	outside	*	*
VRS372	1857502.545	308039.043	664.280	outside	*	*
VRS381	1868134.111	305882.117	659.430	659.390	-0.040	0.002
VRS382	1868141.439	305852.199	658.100	658.010	-0.090	0.008
VRS383	1868148.451	305822.701	656.770	656.650	-0.120	0.014
VRS384	1868155.826	305791.794	655.480	655.330	-0.150	0.023
VRS385	1868162.535	305764.204	654.330	654.280	-0.050	0.003
VRS386	1868169.074	305736.705	653.440	653.350	-0.090	0.008
VRS387	1868176.371	305705.908	652.630	652.520	-0.110	0.012
VRS388	1868183.877	305673.318	651.760	651.730	-0.030	0.001
VRS389	1868190.465	305644.643	651.150	651.120	-0.030	0.001
VRS390	1868197.316	305614.459	650.470	650.410	-0.060	0.004
VRS391	1868203.023	305589.430	649.880	649.770	-0.110	0.012
VRS392	1868189.077	305556.115	649.070	649.000	-0.070	0.005

VRS393	1868199.195	305558.601	649.550	649.520	-0.030	0.001
VRS394	1868209.771	305558.934	649.250	649.210	-0.040	0.002
VRS400	1868549.063	304556.086	603.430	outside	*	*
VRS401	1868548.724	304526.594	602.740	outside	*	*
VRS402	1868548.545	304496.023	602.090	outside	*	*
VRS403	1868548.059	304464.888	601.420	outside	*	*
VRS404	1868547.405	304433.214	601.040	outside	*	*
VRS405	1868546.699	304405.995	600.790	outside	*	*
VRS406	1868545.673	304376.756	600.490	outside	*	*
VRS407	1868544.309	304344.183	600.020	outside	*	*
VRS408	1868521.377	304321.056	598.980	outside	*	*
VRS409	1868531.992	304319.493	599.480	outside	*	*
VRS410	1868542.418	304318.458	599.370	outside	*	*
VRS416	1868788.343	301776.081	548.080	outside	*	*
VRS417	1868768.673	301798.553	548.730	outside	*	*
VRS418	1868746.150	301823.579	549.160	outside	*	*
VRS419	1868723.401	301849.616	549.420	outside	*	*
VRS420	1868703.090	301873.169	549.650	outside	*	*
VRS421	1868683.591	301895.294	549.700	outside	*	*
VRS422	1868661.598	301921.039	550.160	outside	*	*
VRS423	1868638.851	301947.673	550.420	outside	*	*
VRS424	1868781.902	301813.956	548.440	outside	*	*
VRS425	1868771.508	301810.318	548.910	outside	*	*
VRS426	1868732.565	301799.757	547.780	outside	*	*
VRS427	1868702.321	301796.370	547.820	outside	*	*
VRS433	1864132.814	310771.510	623.410	outside	*	*
VRS434	1864155.060	310757.187	624.010	outside	*	*
VRS435	1864178.123	310742.043	624.980	outside	*	*
VRS436	1864196.171	310730.160	626.870	outside	*	*
VRS437	1864208.530	310721.861	628.160	outside	*	*
VRS438	1864225.658	310745.580	628.050	outside	*	*
VRS439	1864242.415	310769.774	627.880	outside	*	*
VRS440	1864258.111	310794.174	627.320	outside	*	*
VRS441	1864275.313	310818.811	626.870	outside	*	*
VRS442	1864291.716	310842.957	626.240	outside	*	*
VRS443	1864308.739	310869.260	625.320	outside	*	*
VRS444	1864326.896	310896.657	624.550	outside	*	*
VRS445	1864344.028	310922.721	623.800	outside	*	*

VRS446	1864361.272	310949.616	623.030	outside	*	*
VRS447	1863319.631	308089.739	664.000	outside	*	*
VRS448	1863330.325	308086.340	663.880	outside	*	*
VRS449	1863306.384	308089.744	663.760	outside	*	*
VRS455	1863328.170	308116.692	663.710	outside	*	*
VRS456	1863336.711	308144.258	663.310	outside	*	*
VRS457	1863345.594	308174.130	662.410	outside	*	*
VRS458	1863354.036	308204.129	661.280	outside	*	*
VRS459	1863362.299	308234.004	660.500	outside	*	*
VRS460	1863370.655	308265.660	659.870	outside	*	*
VRS461	1863378.399	308295.559	659.410	outside	*	*
VRS462	1863386.404	308326.959	658.880	outside	*	*
VRS463	1863394.485	308359.431	658.610	outside	*	*
VRS464	1863401.990	308390.303	658.120	outside	*	*
				Average Dz=	0.027	
					SUM (Dz ²)=	1.406
					N=	90
				RMSE=	$\sqrt{\frac{SUM(Dz^2)}{N}}$ =	0.125

DTM Accuracy Class C Survey Points & Check Points

Point ID	Point Easting	Point Northing	Check Point Elevation	Survey Elevation	Dz	Dz^2
VRS121	1854749.820	314395.252	712.510	712.630	0.120	0.014
VRS122	1854746.938	314393.395	711.790	712.170	0.380	0.144
VRS123	1854737.612	314388.437	714.050	714.420	0.370	0.137
VRS124	1854713.470	314376.478	720.410	720.730	0.320	0.102
VRS125	1854691.783	314365.470	725.880	726.290	0.410	0.168
VRS126	1854677.863	314359.046	730.730	outside	*	*
VRS127	1854787.402	314264.448	720.980	721.460	0.480	0.230
VRS128	1854798.331	314243.565	720.260	720.410	0.150	0.023
VRS129	1854804.843	314234.619	712.670	713.390	0.720	0.518
VRS145	1853059.210	315982.088	800.010	800.210	0.200	0.040
VRS146	1853058.426	315979.616	799.310	799.520	0.210	0.044
VRS147	1853055.107	315971.644	798.660	798.820	0.160	0.026
VRS148	1853049.226	315958.559	797.050	797.220	0.170	0.029
VRS149	1853038.184	315936.527	794.790	795.020	0.230	0.053
VRS152	1853008.967	316022.625	797.220	797.140	-0.080	0.006
VRS153	1853009.602	316024.007	796.700	797.250	0.550	0.303
VRS154	1853013.364	316033.373	801.280	801.610	0.330	0.109
VRS155	1853016.560	316042.099	805.430	805.730	0.300	0.090
VRS156	1853019.324	316048.542	806.790	806.980	0.190	0.036
VRS157	1853022.816	316056.394	807.650	807.890	0.240	0.058
VRS158	1853024.739	316061.439	808.400	808.640	0.240	0.058
VRS167	1856665.256	315163.261	732.030	732.220	0.190	0.036
VRS168	1856659.093	315177.277	732.310	732.390	0.080	0.006
VRS169	1856652.064	315195.776	733.440	733.670	0.230	0.053
VRS170	1856641.437	315218.281	734.470	734.680	0.210	0.044
VRS171	1856632.193	315241.464	735.630	outside	*	*
VRS174	1856676.582	315137.837	731.710	732.270	0.560	0.314
VRS175	1856678.459	315134.016	730.910	731.540	0.630	0.397
VRS176	1856681.174	315127.062	729.430	730.110	0.680	0.462
VRS177	1856686.290	315116.574	729.050	729.420	0.370	0.137
VRS178	1856692.751	315103.827	728.500	728.880	0.380	0.144
VRS179	1856701.137	315085.626	727.810	728.400	0.590	0.348
VRS190	1855855.579	317600.010	936.960	outside	*	*
VRS191	1855844.519	317610.017	934.290	outside	*	*
VRS192	1855833.233	317620.425	931.530	outside	*	*

VRS193	1855822.455	317630.376	928.330	outside	*	*
VRS197	1858628.563	315693.320	706.190	outside	*	*
VRS198	1858616.396	315692.042	706.460	outside	*	*
VRS199	1858597.521	315689.476	705.560	outside	*	*
VRS200	1858576.678	315687.197	705.080	outside	*	*
VRS203	1858666.549	315699.720	705.530	outside	*	*
VRS204	1858679.070	315701.868	707.100	outside	*	*
VRS205	1858697.615	315704.866	707.670	outside	*	*
VRS206	1858719.339	315708.030	709.350	outside	*	*
VRS240	1858833.338	310760.534	640.410	outside	*	*
VRS241	1858827.510	310781.847	640.170	outside	*	*
VRS242	1858821.519	310804.759	639.810	outside	*	*
VRS243	1858814.376	310834.385	639.500	outside	*	*
VRS244	1858808.487	310857.081	639.530	outside	*	*
VRS246	1859809.100	311720.807	638.970	outside	*	*
VRS247	1859806.874	311719.115	640.640	outside	*	*
VRS248	1859799.143	311715.079	641.550	outside	*	*
VRS249	1859789.248	311709.885	642.160	outside	*	*
VRS250	1859773.192	311700.833	642.490	outside	*	*
VRS253	1859830.118	311732.238	640.180	outside	*	*
VRS254	1859831.865	311733.225	639.360	outside	*	*
VRS255	1859832.908	311733.952	640.070	outside	*	*
VRS256	1859850.167	311743.450	639.410	outside	*	*
VRS257	1859869.946	311754.444	639.380	outside	*	*
VRS258	1859887.919	311765.694	639.290	outside	*	*
VRS276	1859693.835	302618.560	713.070	outside	*	*
VRS277	1859673.471	302624.640	712.020	outside	*	*
VRS278	1859656.191	302629.797	711.740	outside	*	*
VRS282	1859621.636	302642.102	710.250	outside	*	*
VRS283	1859609.702	302646.441	710.210	outside	*	*
VRS284	1859590.782	302652.975	708.720	outside	*	*
VRS285	1859567.201	302661.634	707.350	outside	*	*
VRS286	1859546.226	302669.671	706.550	outside	*	*
VRS314	1864233.100	304692.733	796.140	outside	*	*
VRS315	1864236.510	304699.301	795.730	outside	*	*
VRS316	1864239.672	304706.874	799.870	outside	*	*
VRS317	1864243.022	304714.076	801.090	outside	*	*
VRS318	1864251.131	304728.261	801.530	outside	*	*

VRS319	1864252.974	304731.690	801.100	outside	*	*
VRS320	1864254.706	304735.108	801.510	outside	*	*
VRS321	1864263.957	304749.760	802.390	outside	*	*
VRS322	1864270.293	304760.748	803.080	outside	*	*
VRS323	1864277.097	304771.221	805.510	outside	*	*
VRS324	1864286.052	304784.822	810.440	outside	*	*
VRS328	1866260.753	301586.884	618.990	outside	*	*
VRS329	1866230.855	301576.689	620.060	outside	*	*
VRS330	1866199.419	301567.018	621.070	outside	*	*
VRS331	1866168.971	301558.786	622.290	outside	*	*
VRS332	1866132.494	301548.342	623.500	outside	*	*
VRS333	1866102.437	301540.097	624.360	outside	*	*
VRS334	1866072.412	301532.319	625.330	outside	*	*
VRS335	1866039.252	301523.452	626.280	outside	*	*
VRS336	1866007.637	301514.670	627.650	outside	*	*
VRS337	1865975.122	301505.373	628.730	outside	*	*
VRS352	1867329.414	309116.924	631.450	outside	*	*
VRS373	1857482.078	308028.280	663.450	outside	*	*
VRS374	1857457.333	308019.676	663.100	outside	*	*
VRS375	1857441.783	308017.403	662.860	outside	*	*
VRS376	1857424.393	308016.530	662.920	outside	*	*
VRS377	1857409.151	308016.203	662.910	outside	*	*
VRS378	1857385.170	308014.643	663.280	outside	*	*
VRS379	1857364.335	308010.102	660.690	outside	*	*
VRS380	1857341.034	308006.398	659.950	outside	*	*
VRS395	1868216.340	305560.591	648.620	648.880	0.260	0.068
VRS396	1868229.481	305562.217	650.320	650.650	0.330	0.109
VRS397	1868256.937	305566.042	651.810	652.070	0.260	0.068
VRS398	1868285.668	305569.193	653.440	653.770	0.330	0.109
VRS399	1868309.930	305572.190	655.350	655.810	0.460	0.212
VRS411	1868552.458	304317.632	598.340	outside	*	*
VRS412	1868581.794	304316.167	597.200	outside	*	*
VRS413	1868617.576	304314.583	595.410	outside	*	*
VRS414	1868659.882	304311.761	593.450	outside	*	*
VRS415	1868689.529	304306.109	594.450	outside	*	*
VRS428	1868672.509	301791.863	548.150	outside	*	*
VRS429	1868639.954	301780.196	548.300	outside	*	*
VRS430	1868615.168	301770.748	549.010	outside	*	*

VRS431	1868597.815	301762.244	553.300	outside	*	*
VRS432	1868573.818	301750.356	555.220	outside	*	*
VRS450	1863277.132	308092.649	663.390	outside	*	*
VRS451	1863245.665	308094.471	662.470	outside	*	*
VRS452	1863215.941	308095.746	662.250	outside	*	*
VRS453	1863186.323	308097.522	662.400	outside	*	*
VRS454	1863154.723	308099.555	662.590	outside	*	*
LC038	1859562.971	311205.613	632.784	633.110	0.326	0.106
LC039	1859565.974	311201.170	632.628	632.930	0.302	0.091
LC040	1859569.184	311195.979	632.603	632.940	0.337	0.114
LC041	1859571.905	311191.108	632.496	632.770	0.274	0.075
LC043	1859579.794	311182.289	632.604	633.010	0.406	0.165
LC042	1859575.862	311186.560	632.322	632.630	0.308	0.095
LC044	1859583.344	311178.405	634.120	634.170	0.050	0.003
LC036	1859493.867	311143.110	632.917	633.160	0.243	0.059
LC034	1859499.020	311134.780	632.707	633.080	0.373	0.139
LC035	1859496.458	311138.473	632.830	633.070	0.240	0.058
LC037	1859490.005	311148.299	632.989	633.280	0.291	0.085
LC032	1859507.147	311122.718	633.507	633.820	0.313	0.098
LC031	1859508.769	311120.263	634.710	634.890	0.180	0.032
LC033	1859502.000	311130.536	632.589	632.960	0.371	0.138
				Average Dz=	0.312	
					SUM (Dz ²)=	5.953
					N=	49
				RMSE=	$\sqrt{\frac{SUM(Dz^2)}{N}}$	0.349

Class I Planimetric Features Compared to Check Points

Point	Check Point Easting	Check Point Northing	Planimetric Easting	Planimetric Northing	Residual East	Residual North	Residual East ^2	Residual North^2
LC001	1859625.900	311209.154	1859625.551	311209.613	-0.349	0.459	0.122	0.211
LC002	1859621.985	311206.193	1859621.638	311206.586	-0.347	0.393	0.120	0.154
LC003	1859618.100	311203.160	1859617.753	311203.572	-0.347	0.412	0.120	0.170
LC004	1859613.723	311199.772	1859613.367	311200.184	-0.356	0.412	0.127	0.170
LC005	1859609.151	311196.222	1859608.786	311196.652	-0.365	0.430	0.133	0.185

LC006	1859604.426	311192.550	1859604.042	311192.999	-0.384	0.449	0.147	0.202
LC007	1859598.753	311188.225	1859598.434	311188.618	-0.319	0.393	0.102	0.154
LC008	1859593.462	311184.013	1859593.087	311184.462	-0.375	0.449	0.141	0.202
LC009	1859586.948	311179.105	1859586.647	311179.471	-0.301	0.366	0.091	0.134
LC010	1859581.708	311174.906	1859581.361	311175.355	-0.347	0.449	0.120	0.202
LC011	1859575.056	311169.755	1859574.737	311170.204	-0.319	0.449	0.102	0.202
LC012	1859568.330	311164.587	1859568.020	311164.980	-0.310	0.393	0.096	0.154
LC013	1859561.680	311159.458	1859561.389	311159.824	-0.291	0.366	0.085	0.134
LC014	1859555.519	311154.576	1859555.209	311155.016	-0.310	0.440	0.096	0.194
LC015	1859549.290	311149.730	1859548.971	311150.170	-0.319	0.440	0.102	0.194
LC016	1859544.913	311146.405	1859544.631	311146.798	-0.282	0.393	0.080	0.154
LC017	1859540.238	311142.572	1859539.845	311143.067	-0.393	0.495	0.154	0.245
LC018	1859535.359	311138.869	1859535.003	311139.313	-0.356	0.444	0.127	0.197
LC019	1859531.070	311135.623	1859530.760	311136.026	-0.310	0.403	0.096	0.162
LC020	1859526.999	311132.476	1859526.717	311132.869	-0.282	0.393	0.080	0.154
LC021	1859522.666	311129.087	1859522.365	311129.490	-0.301	0.403	0.091	0.162
LC022	1859518.036	311125.439	1859517.735	311125.888	-0.301	0.449	0.091	0.202
LC023	1859513.121	311121.581	1859512.793	311122.048	-0.328	0.467	0.108	0.218
LC024	1859507.660	311117.490	1859507.387	311117.865	-0.273	0.375	0.075	0.141
LC025	1859503.331	311114.077	1859503.012	311114.489	-0.319	0.412	0.102	0.170
LC026	1859498.112	311110.081	1859497.830	311110.474	-0.282	0.393	0.080	0.154
LC027	1859491.504	311105.071	1859491.291	311105.400	-0.213	0.329	0.045	0.108
LC028	1859481.246	311096.986	1859480.955	311097.361	-0.291	0.375	0.085	0.141
LC029	1859474.429	311091.711	1859474.147	311092.067	-0.282	0.356	0.080	0.127
LC030	1859468.977	311087.519	1859468.723	311087.866	-0.254	0.347	0.065	0.120
VRS101	1854809.833	314201.318	1854809.847	314201.298	0.014	-0.020	0.000	0.000
VRS102	1854832.668	314215.870	1854832.676	314215.857	0.008	-0.013	0.000	0.000
VRS103	1854855.141	314230.114	1854855.113	314230.167	-0.028	0.053	0.001	0.003
VRS104	1854879.105	314245.376	1854879.104	314245.378	-0.001	0.002	0.000	0.000
VRS105	1854905.508	314262.194	1854905.537	314262.148	0.029	-0.046	0.001	0.002
VRS106	1854930.842	314278.290	1854930.844	314278.287	0.002	-0.003	0.000	0.000
VRS107	1854957.171	314294.952	1854957.109	314295.054	-0.062	0.102	0.004	0.010
VRS108	1854981.937	314310.864	1854981.906	314310.911	-0.031	0.047	0.001	0.002
VRS109	1855006.480	314326.555	1855006.394	314326.706	-0.086	0.151	0.007	0.023
VRS110	1855031.900	314342.943	1855031.848	314343.047	-0.052	0.104	0.003	0.011
VRS136	1852862.493	316059.557	1852862.484	316059.524	-0.009	-0.033	0.000	0.001
VRS137	1852894.763	316047.943	1852894.765	316047.950	0.002	0.007	0.000	0.000
VRS138	1852925.971	316036.052	1852925.965	316036.037	-0.006	-0.015	0.000	0.000

VRS139	1852953.357	316025.026	1852953.441	316025.251	0.084	0.225	0.007	0.051
VRS140	1852981.735	316014.492	1852981.757	316014.559	0.022	0.067	0.000	0.004
VRS141	1853003.893	316006.437	1853003.803	316006.147	-0.090	-0.290	0.008	0.084
VRS142	1853031.933	315995.909	1853031.915	315995.853	-0.018	-0.056	0.000	0.003
VRS143	1853060.412	315985.281	1853060.392	315985.184	-0.020	-0.097	0.000	0.009
VRS159	1856875.348	315250.227	1856875.272	315250.423	-0.076	0.196	0.006	0.038
VRS160	1856846.312	315237.716	1856846.177	315237.966	-0.135	0.250	0.018	0.063
VRS161	1856819.398	315226.158	1856819.336	315226.311	-0.062	0.153	0.004	0.023
VRS162	1856791.079	315213.818	1856791.009	315213.993	-0.070	0.175	0.005	0.031
VRS163	1856760.242	315200.363	1856760.134	315200.581	-0.108	0.218	0.012	0.048
VRS164	1856730.754	315187.499	1856730.662	315187.703	-0.092	0.204	0.008	0.042
VRS165	1856702.581	315175.127	1856702.462	315175.389	-0.119	0.262	0.014	0.069
VRS166	1856667.117	315159.685	1856667.108	315159.706	-0.009	0.021	0.000	0.000
VRS381	1868134.111	305882.118	1868134.165	305882.139	0.054	0.021	0.003	0.000
VRS382	1868141.439	305852.200	1868141.454	305852.204	0.015	0.004	0.000	0.000
VRS383	1868148.451	305822.701	1868148.561	305822.718	0.110	0.017	0.012	0.000
VRS384	1868155.826	305791.794	1868155.923	305791.811	0.097	0.017	0.009	0.000
VRS385	1868162.535	305764.204	1868162.528	305764.203	-0.007	-0.001	0.000	0.000
VRS386	1868169.074	305736.705	1868169.104	305736.711	0.030	0.006	0.001	0.000
VRS387	1868176.371	305705.908	1868176.508	305705.932	0.137	0.024	0.019	0.001
VRS388	1868183.877	305673.318	1868183.942	305673.328	0.065	0.010	0.004	0.000
VRS389	1868190.465	305644.643	1868190.536	305644.656	0.071	0.013	0.005	0.000
VRS390	1868197.316	305614.459	1868197.354	305614.467	0.038	0.008	0.001	0.000
VRS391	1868203.023	305589.430	1868202.928	305589.417	-0.095	-0.013	0.009	0.000
VRS394	1868209.771	305558.934	1868209.630	305558.913	-0.141	-0.021	0.020	0.000
						SUMs=	3.245	5.635
						N=	68	68
						RMSE=	0.218	0.288

$$RMSE = \sqrt{\frac{SUM(Residual^2)}{N}}$$