



# North Carolina Department of Public Safety

## Emergency Management

Roy Cooper, Governor  
Erik A. Hooks, Secretary

Michael A. Sprayberry, Director

### Aerial Imagery Quality Control Report – 2018 Orthoimagery Project

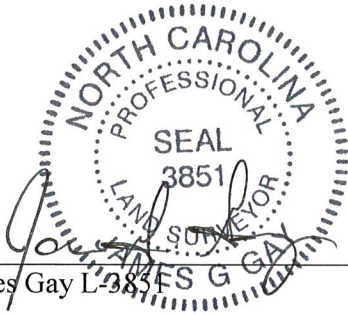
The North Carolina Geodetic Survey (NCGS) performed a horizontal quality control (QC) survey of aerial imagery collected in twenty-six (26) North Carolina counties. The purpose of the QC survey was to test the horizontal accuracy of the aerial imagery collected as part of the 2018 Orthoimagery Project, which is funded by the NC 911 Board.

NCGS contracted private surveying firms to collect the horizontal QC test points and submit a report, which are on file at NCGS. Each of these firms provided a signed and sealed report to NCGS that included all the data they collected under the responsible charge of a North Carolina licensed Professional Surveyor.

In addition to the contractor collected QC test points, NCGS personnel, who were under the supervision of James Gay (L-3851), collected supplemental QC test points using the following Global Navigation Satellite System (GNSS) survey parameters:

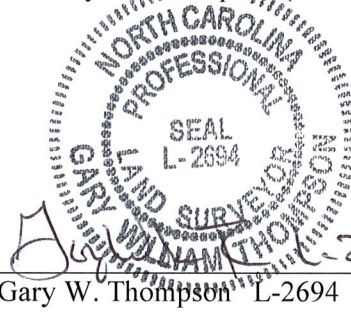
<b>Class of survey:</b>	Class A (horizontal) Class C (vertical)
<b>Horizontal accuracy:</b>	0.02 meters (0.06USft) at the 95% confidence level
<b>Vertical accuracy:</b>	0.05 meters (0.16USft) at the 95% confidence level
<b>Type of field procedure used:</b>	North Carolina Real-Time Network (NCRTN)
<b>Dates of survey:</b>	Dec.18,2018-Jan.7, 2019(Supplemental QC test points)
<b>Horizontal datum/epoch</b>	North American Datum 83 (2011) epoch 2010.0
<b>Vertical datum/epoch</b>	North American Vertical Datum of 1988 (NAVD88)
<b>Public fixed control used:</b>	North Carolina Continuously Operating Reference Station Network (CORS) and North Carolina Real-Time Network (NCRTN)
<b>Geoid model:</b>	Geoid 12 B
<b>Combined grid factor:</b>	See included control spreadsheet
<b>Units:</b>	US Survey Feet

The attached report contains the results of the horizontal QC surveys conducted by the contractors and the supplemental QC surveys conducted by NCGS personnel. The review of the field data and generation of the final QC report were performed under the supervision of Gary W. Thompson (L-2694).



James Gay L-3851

1/31/19  
Date



Gary W. Thompson L-2694

2/15/19  
Date

**MAILING ADDRESS:**  
4298 Mail Service Center  
Raleigh, NC 27699-4298  
geodeticsurvey.nc.gov



An Equal Opportunity Employer

**OFFICE LOCATION:**  
4105 Reedy Creek Rd  
Raleigh, NC 27607  
Telephone: (919) 733-3836  
Fax: (919) 733-4407

This report contains the horizontal Quality Control (QC) reports for the following counties:

- Alamance
- Alexander
- Allegheny
- Ashe
- Avery
- Burke
- Caldwell
- Caswell
- Catawba
- Davidson
- Davie
- Forsyth
- Guilford
- Iredell
- Madison
- McDowell
- Mitchell
- Randolph
- Rockingham
- Rowan
- Stokes
- Surry
- Watauga
- Wilkes
- Yadkin
- Yancey

# 2018 Orthoimagery Statistics Summary

NAD 83/2011 US Survey Feet

County	MinΔX:	MinΔY:	MaxΔX:	MaxΔY:	MeanΔX	MeanΔY	RmseX:	RmseY:	RmseH:	CE90:	CE95:	CI:	No.Obs.:	NSSDA:					
Alamance	-0.694	-0.651	0.781	0.825	0.181	0.035	0.387	0.285	0.481	0.678	0.773	0.088	50	0.832					
Alexander	-0.608	-0.738	1.215	1.172	0.085	0.067	0.435	0.496	0.659	0.996	1.136	0.136	45	1.141					
Alleghany	-0.955	-0.564	1.128	1.345	0.081	0.165	0.380	0.419	0.565	0.821	0.936	0.114	43	0.978					
Ashe	-0.521	-0.738	0.781	0.738	0.017	0.068	0.289	0.285	0.406	0.614	0.700	0.083	46	0.703					
Avery	-0.868	-0.911	1.389	0.326	0.233	-0.305	0.487	0.405	0.633	0.751	0.857	0.096	51	1.095					
Burke	-1.042	-1.259	1.302	0.564	0.191	-0.264	0.427	0.503	0.660	0.878	1.002	0.113	50	1.142					
Caldwell	-0.955	-1.172	1.215	0.738	0.354	-0.186	0.541	0.408	0.678	0.838	0.956	0.111	48	1.173					
Caswell	-1.042	-0.716	1.302	0.846	0.097	0.150	0.437	0.357	0.564	0.812	0.926	0.100	55	0.977					
Catawba	-0.781	-0.477	0.781	0.651	-0.088	0.115	0.415	0.270	0.495	0.704	0.803	0.085	57	0.857					
Davidson	-1.215	-0.998	1.215	1.172	0.101	0.079	0.599	0.408	0.725	1.073	1.224	0.132	55	1.255					
Davie	-1.389	-0.391	1.302	0.957	-0.052	0.272	0.612	0.435	0.751	1.033	1.178	0.151	39	1.300					
Forsyth	-1.128	-0.998	1.476	0.564	0.097	0.098	0.698	0.313	0.765	1.071	1.221	0.140	49	1.323					
Guilford	-1.042	-0.825	0.434	0.738	-0.106	0.072	0.308	0.291	0.424	0.619	0.706	0.079	51	0.733					
Iredell	-0.955	-0.651	0.694	0.825	-0.051	0.079	0.346	0.346	0.489	0.735	0.838	0.088	58	0.847					
Madison	-1.042	-0.651	0.955	0.998	0.122	0.088	0.393	0.374	0.542	0.799	0.912	0.111	43	0.938					
McDowell	-0.608	-1.780	0.955	0.391	0.164	-0.452	0.405	0.603	0.726	0.834	0.952	0.114	45	1.257					
Mitchell	-0.868	-0.738	1.389	1.172	0.299	-0.093	0.591	0.335	0.679	0.902	1.029	0.120	47	1.175					
Randolph	-0.608	-0.651	1.042	0.911	0.162	-0.064	0.386	0.292	0.484	0.687	0.783	0.077	66	0.838					
Rockingham	-1.302	-0.391	0.781	0.477	-0.035	0.039	0.333	0.244	0.413	0.621	0.708	0.080	50	0.715					
Rowan	-1.302	-0.911	1.563	1.432	0.063	0.145	0.607	0.481	0.775	1.151	1.313	0.146	52	1.341					
Stokes	-1.389	-1.172	0.955	0.738	0.039	-0.143	0.585	0.379	0.697	1.014	1.157	0.132	49	1.207					
Surry	-1.042	-1.085	1.215	0.391	-0.002	-0.365	0.495	0.492	0.698	0.893	1.018	0.097	70	1.209					
Watauga	-0.608	-0.911	1.389	0.651	-0.022	-0.068	0.365	0.284	0.462	0.696	0.794	0.106	36	0.800					
Wilkes	-0.694	-0.998	0.868	0.651	0.044	0.042	0.360	0.320	0.482	0.731	0.833	0.087	59	0.834					
Yadkin	-1.128	-0.651	1.215	1.345	0.130	0.037	0.609	0.416	0.737	1.096	1.250	0.154	42	1.276					
Yancey	-1.302	-1.172	0.955	0.651	0.044	-0.242	0.418	0.468	0.627	0.885	1.009	0.115	49	1.086					
County-Wide Average													0.458	0.381	0.601	0.844	0.962	0.110	1.040



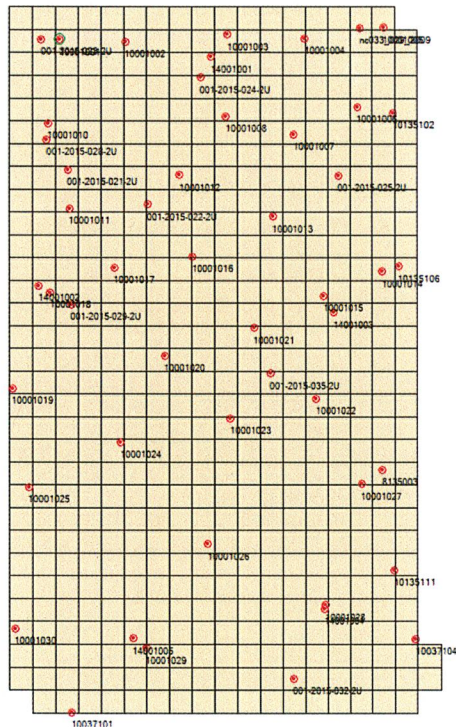
## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Aquisition: Start: 12/3/2018 Finish: 12/3/2018

## Metadata Information

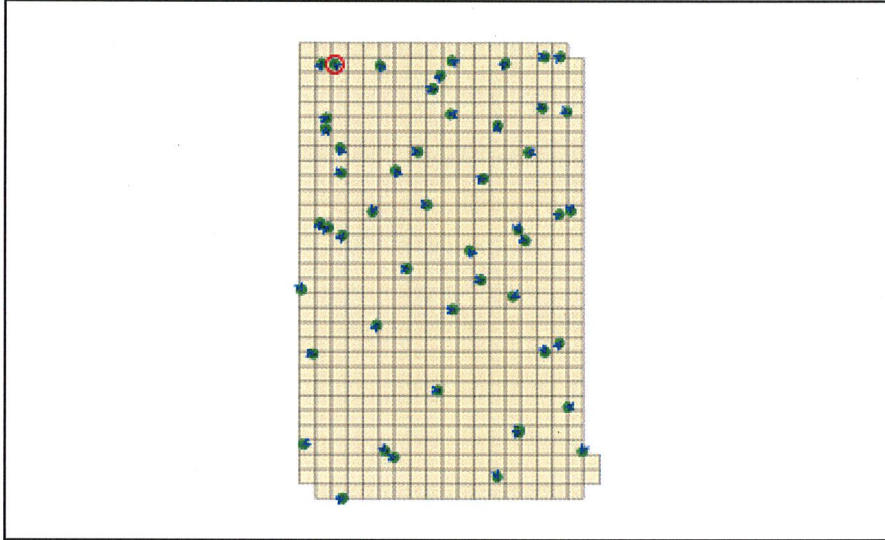
Index File Name: alamance\_tiles.shp  
# of Polygons: 558  
# of Matching Images: 558  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: J:\Alamance2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

## Tiled-Image Area



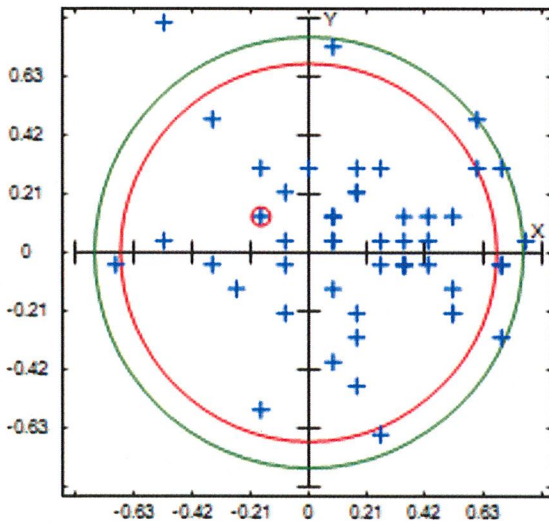


Vector Offset



Scaling Factor: 200

Circular Error



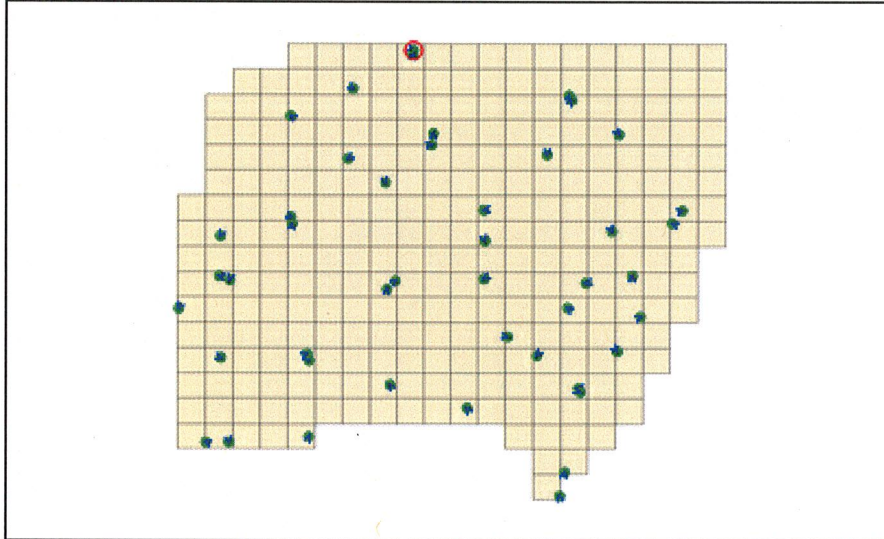
Error Statistics

Min $\Delta X$ :	-0.694
Min $\Delta Y$ :	-0.651
Max $\Delta X$ :	0.781
Max $\Delta Y$ :	0.825
Mean $\Delta X$ :	0.181
Mean $\Delta Y$ :	0.035
RmseX:	0.387
RmseY:	0.285
RmseH:	0.481
NSSDA:	0.832
No. Obs.:	50
CE 90:	0.678
CE 95:	0.773
CI:	0.088



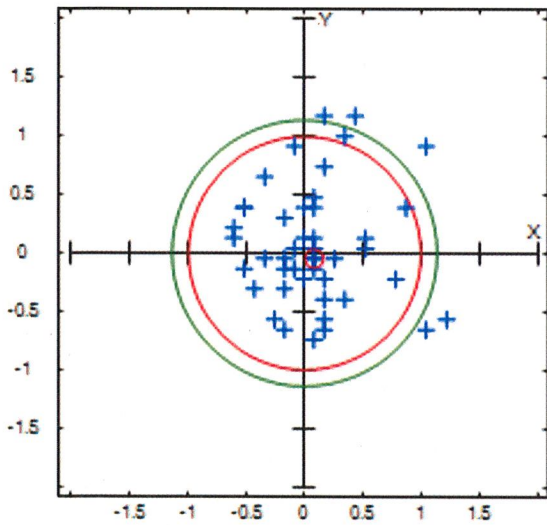


Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min $\Delta X$ :	-0.608
Min $\Delta Y$ :	-0.738
Max $\Delta X$ :	1.215
Max $\Delta Y$ :	1.172
Mean $\Delta X$ :	0.085
Mean $\Delta Y$ :	0.067
RmseX:	0.435
RmseY:	0.496
RmseH:	0.659
NSSDA:	1.141
No. Obs.:	45
CE 90:	0.996
CE 95:	1.136
CI:	0.136



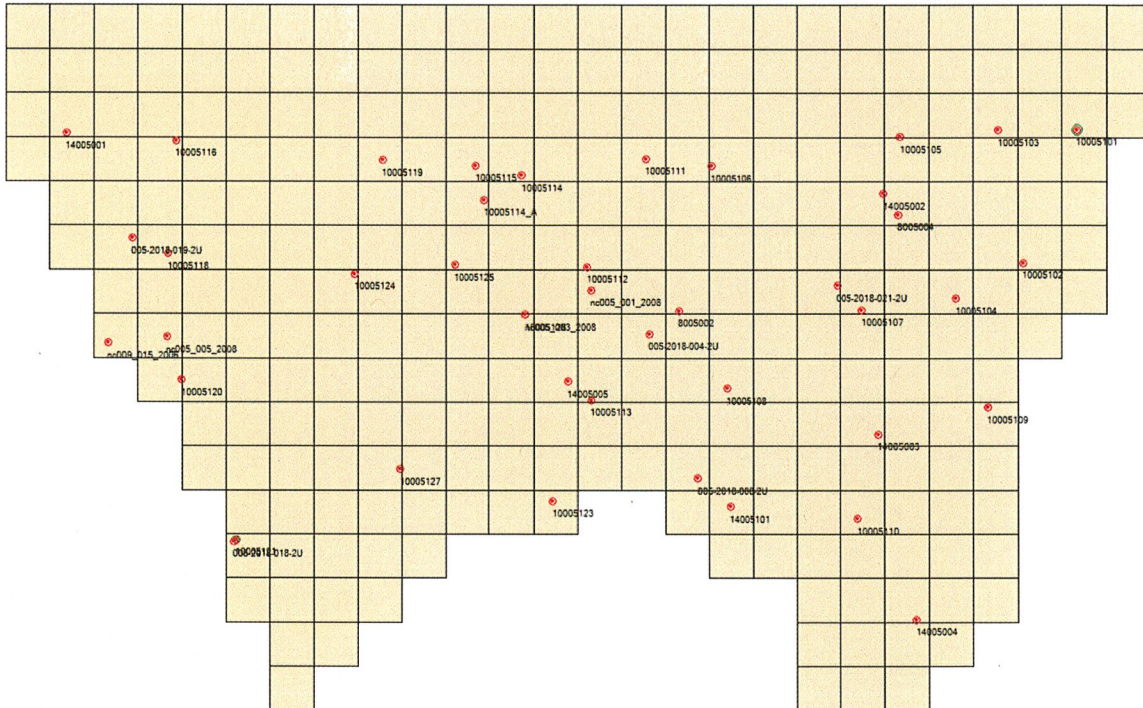
## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Acquisition: Start: 12/3/2018 Finish: 12/3/2018

## Metadata Information

Index File Name: alleghany\_tiles.shp  
# of Polygons: 301  
# of Matching Images: 301  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: K:\2018\_imagery\Alleghany2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

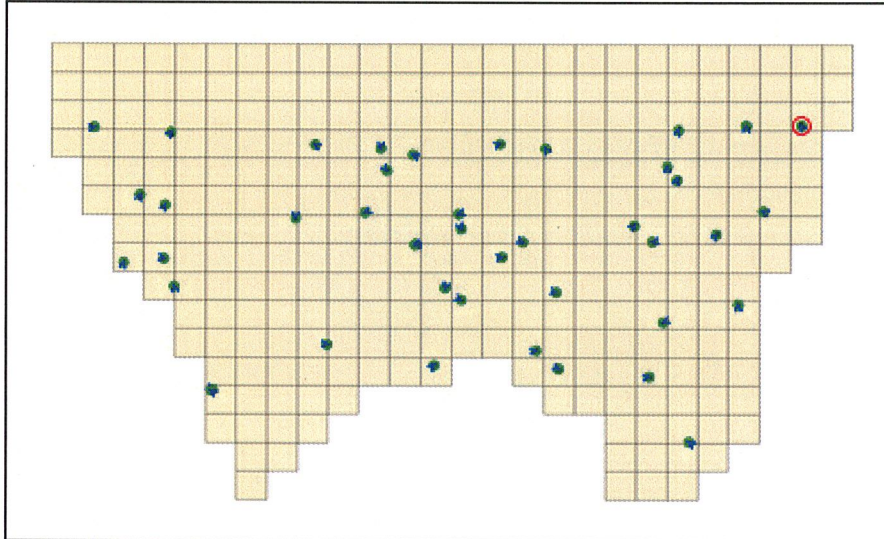
## Tiled-Image Area





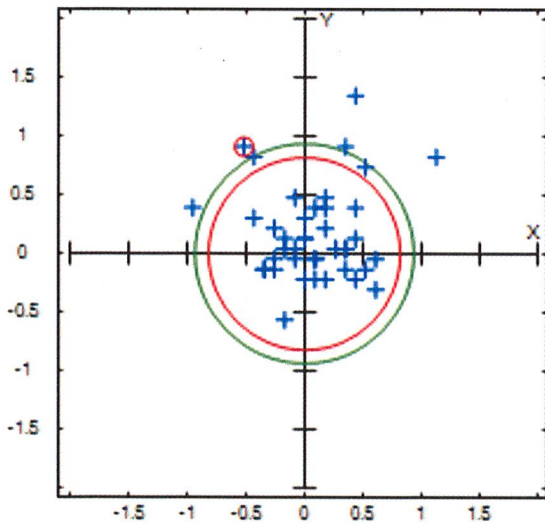


Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min $\Delta X$ :	-0.955
Min $\Delta Y$ :	-0.564
Max $\Delta X$ :	1.128
Max $\Delta Y$ :	1.345
Mean $\Delta X$ :	0.081
Mean $\Delta Y$ :	0.165
RmseX:	0.38
RmseY:	0.419
RmseH:	0.565
NSSDA:	0.978
No. Obs.:	43
CE 90:	0.821
CE 95:	0.936
CI:	0.114



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## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Aquisition: Start: 12/3/2018 Finish: 12/3/2018

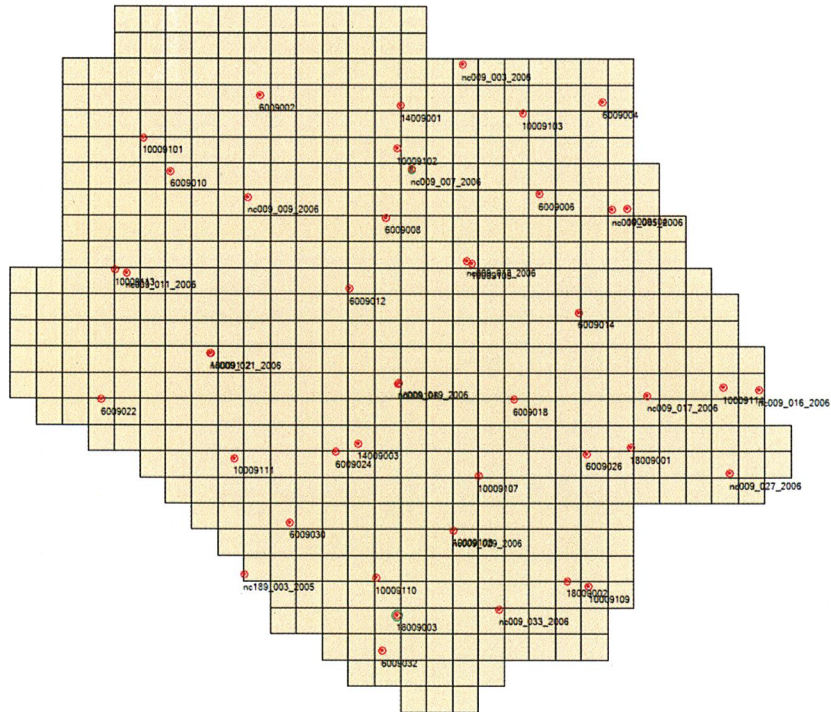
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## Metadata Information

Index File Name: ashe\_files.shp  
# of Polygons: 545  
# of Matching Images: 545  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: I:\Ashe2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

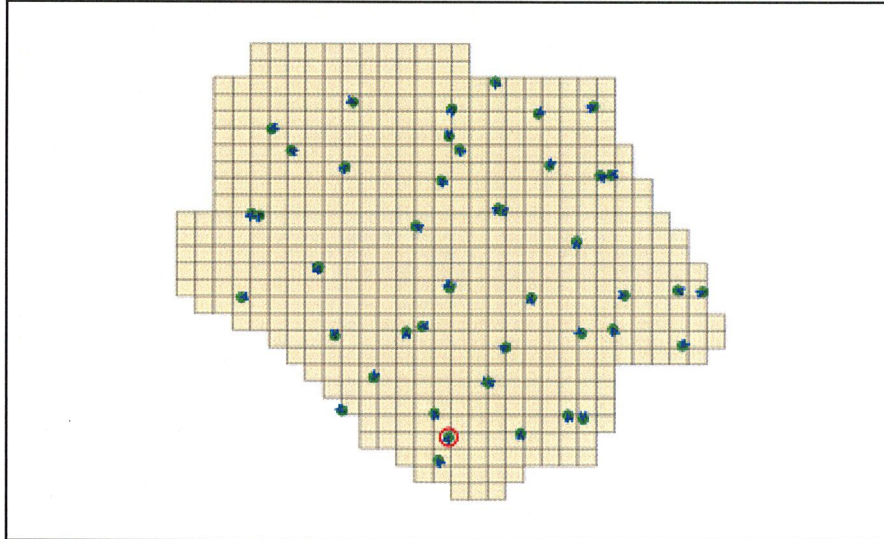
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## Tiled-Image Area



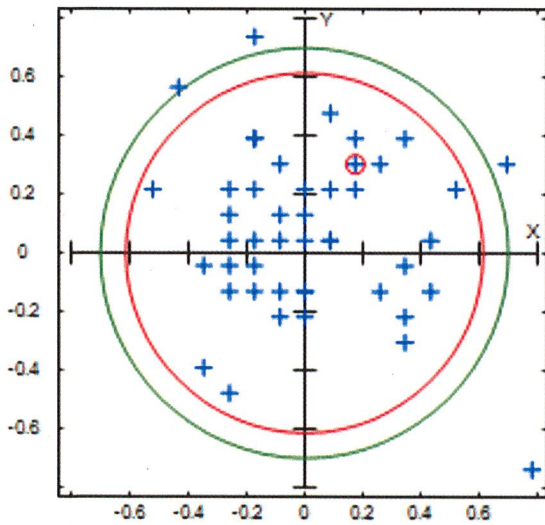


Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min $\Delta X$ :	-0.521
Min $\Delta Y$ :	-0.738
Max $\Delta X$ :	0.781
Max $\Delta Y$ :	0.738
Mean $\Delta X$ :	0.017
Mean $\Delta Y$ :	0.068
RmseX:	0.289
RmseY:	0.285
RmseH:	0.406
NSSDA:	0.703
No. Obs.:	46
CE 90:	0.614
CE 95:	0.7
CI:	0.083



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## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Aquisition: Start: 12/1/2018 Finish: 12/1/2018

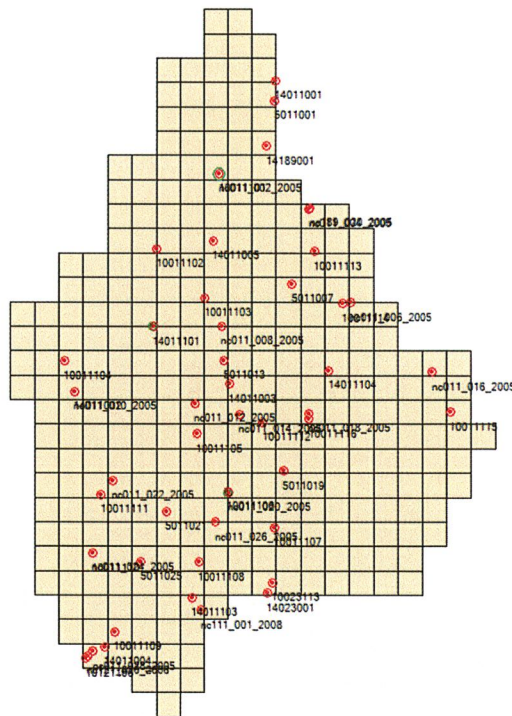
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## Metadata Information

Index File Name: avery\_tiles.shp  
# of Polygons: 318  
# of Matching Images: 318  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: I:\Avery2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

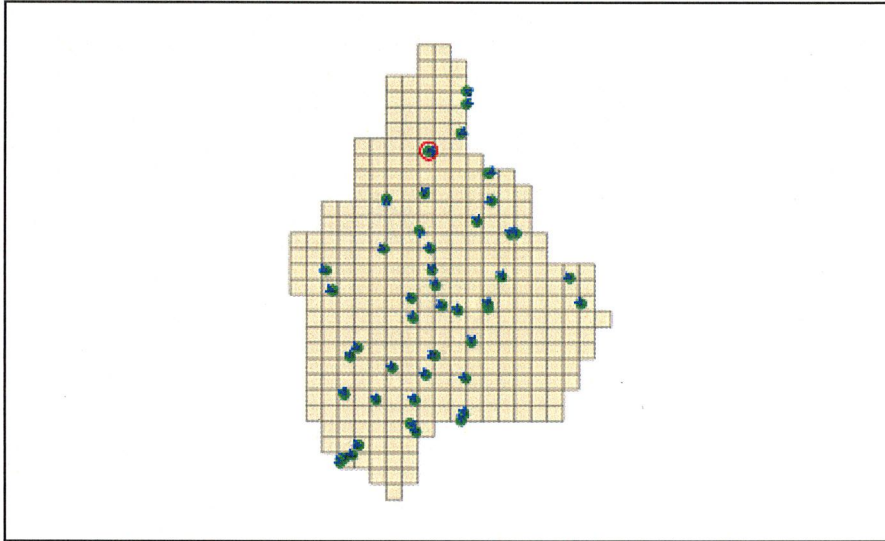
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## Tiled-Image Area



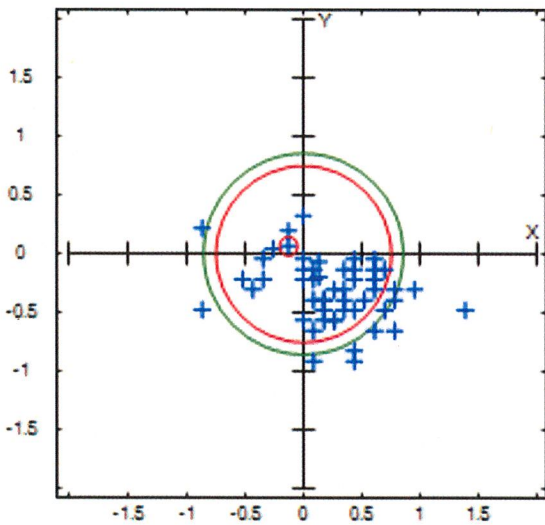


Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min $\Delta X$ :	-0.868
Min $\Delta Y$ :	-0.911
Max $\Delta X$ :	1.389
Max $\Delta Y$ :	0.326
Mean $\Delta X$ :	0.233
Mean $\Delta Y$ :	-0.305
RmseX:	0.487
RmseY:	0.405
RmseH:	0.633
NSSDA:	1.095
No. Obs.:	51
CE 90:	0.751
CE 95:	0.857
CI:	0.096



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## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Acquisition: Start: 12/3/2018 Finish: 12/3/2018

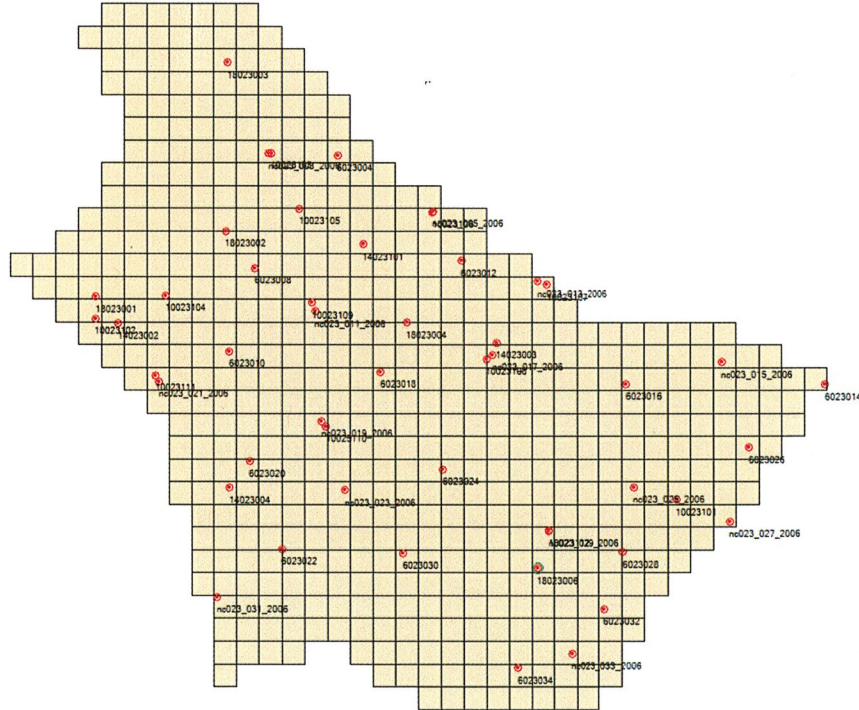
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## Metadata Information

Index File Name: burke\_files.shp  
# of Polygons: 590  
# of Matching Images: 590  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: J:\Burke2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

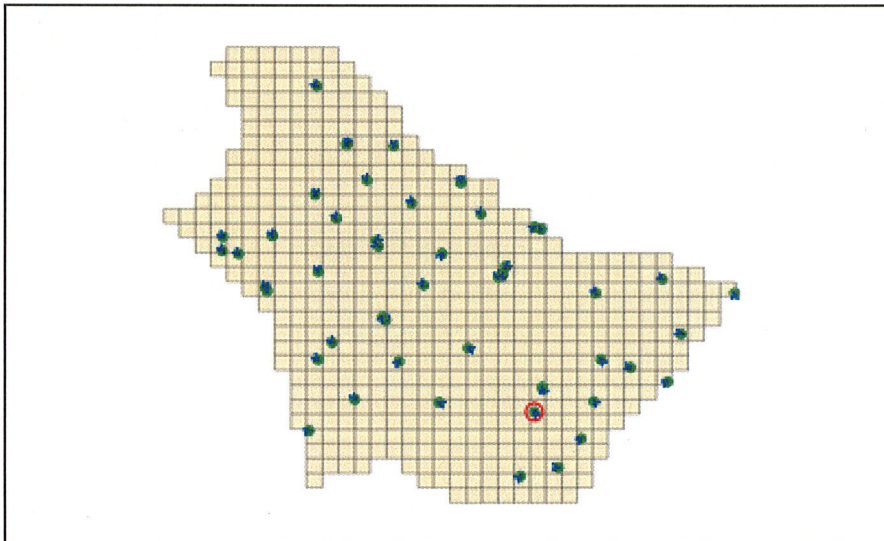
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## Tiled-Image Area



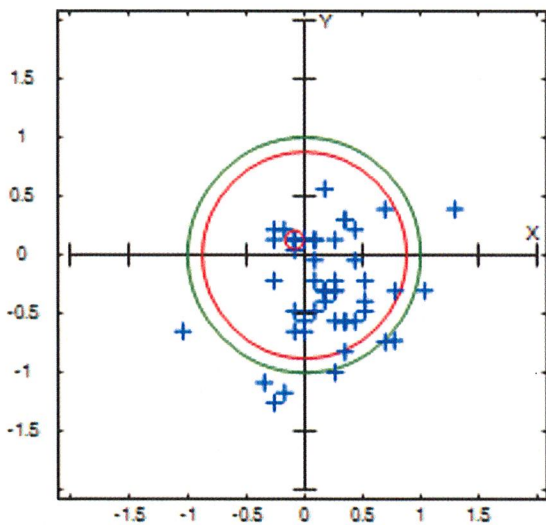


Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min $\Delta X$ :	-1.042
Min $\Delta Y$ :	-1.259
Max $\Delta X$ :	1.302
Max $\Delta Y$ :	0.564
Mean $\Delta X$ :	0.191
Mean $\Delta Y$ :	-0.264
RmseX:	0.427
RmseY:	0.503
RmseH:	0.66
NSSDA:	1.142
No. Obs.:	50
CE 90:	0.878
CE 95:	1.002
CI:	0.113



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## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Acquisition: Start: 12/3/2018 Finish: 12/3/2018

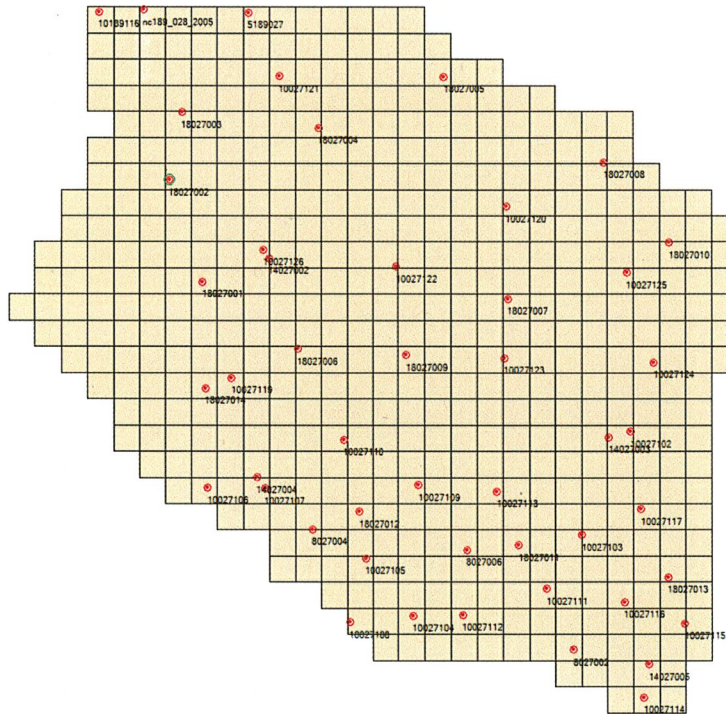
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## Metadata Information

Index File Name: caldwell\_tiles.shp  
# of Polygons: 526  
# of Matching Images: 526  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: I:\Caldwell2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

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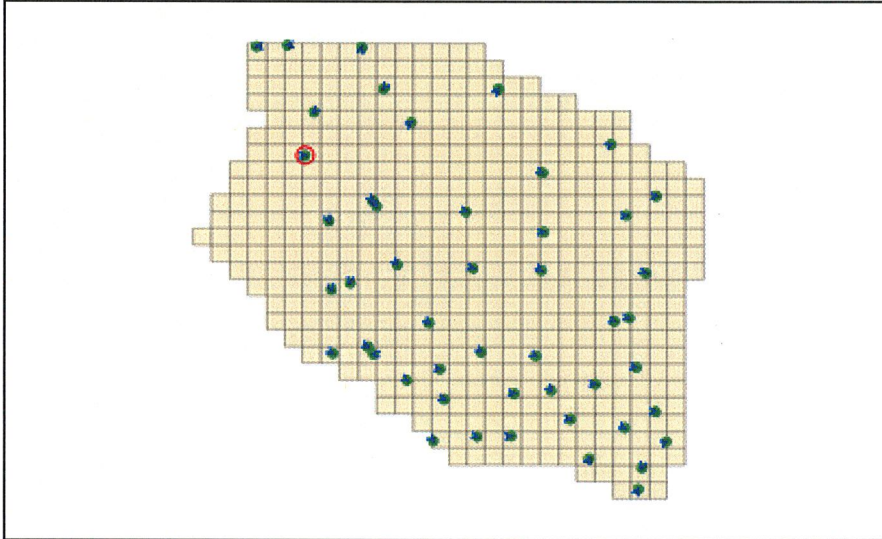
## Tiled-Image Area





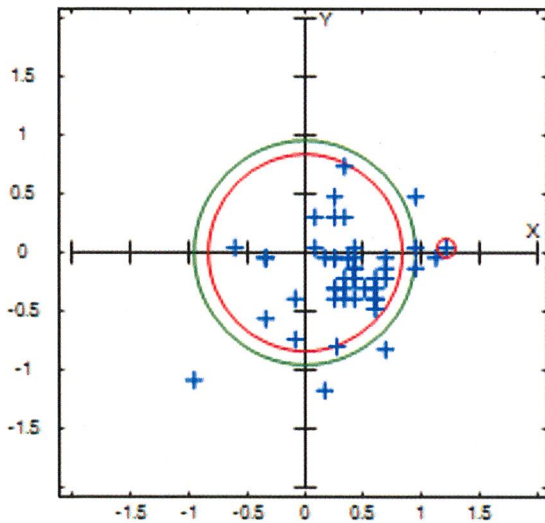


Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min $\Delta X$ :	-0.955
Min $\Delta Y$ :	-1.172
Max $\Delta X$ :	1.215
Max $\Delta Y$ :	0.738
Mean $\Delta X$ :	0.354
Mean $\Delta Y$ :	-0.186
RmseX:	0.541
RmseY:	0.408
RmseH:	0.678
NSSDA:	1.173
No. Obs.:	48
CE 90:	0.838
CE 95:	0.956
CI:	0.111

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building  
4105 Reedy Creek Road  
Raleigh, North Carolina 27607  
(919)733-3836



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## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Aquisition: Start: 12/3/2018 Finish: 12/3/2018

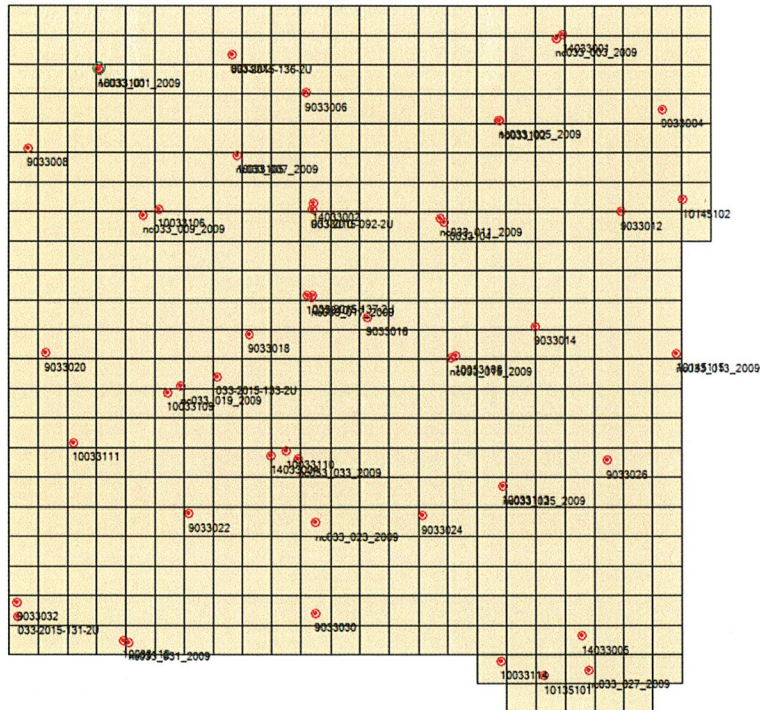
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## Metadata Information

Index File Name: caswell\_files.shp  
# of Polygons: 526  
# of Matching Images: 526  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: J:\Caswell2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

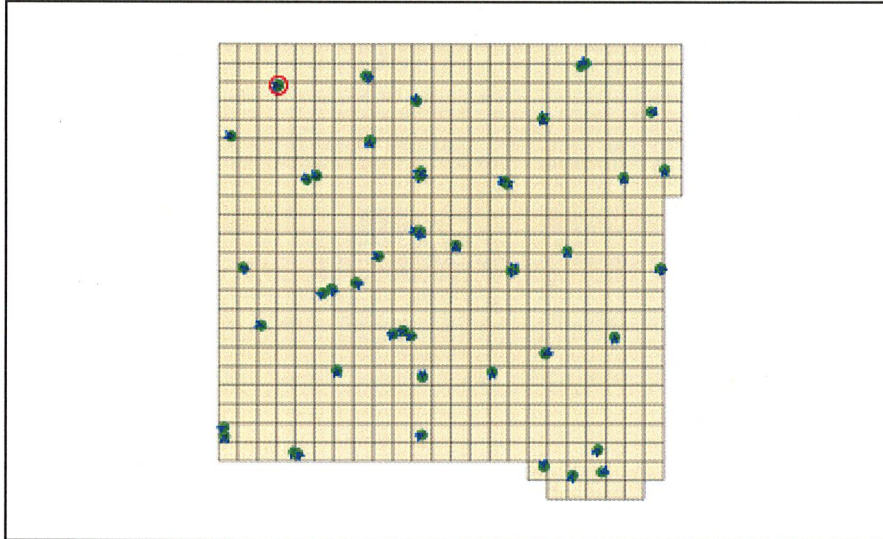
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## Tiled-Image Area



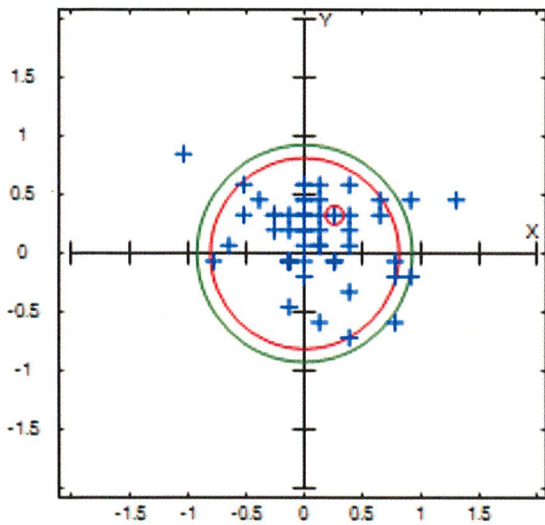


Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min $\Delta X$ :	-1.042
Min $\Delta Y$ :	-0.716
Max $\Delta X$ :	1.302
Max $\Delta Y$ :	0.846
Mean $\Delta X$ :	0.097
Mean $\Delta Y$ :	0.15
RmseX:	0.437
RmseY:	0.357
RmseH:	0.564
NSSDA:	0.977
No. Obs.:	55
CE 90:	0.812
CE 95:	0.926
CI:	0.1



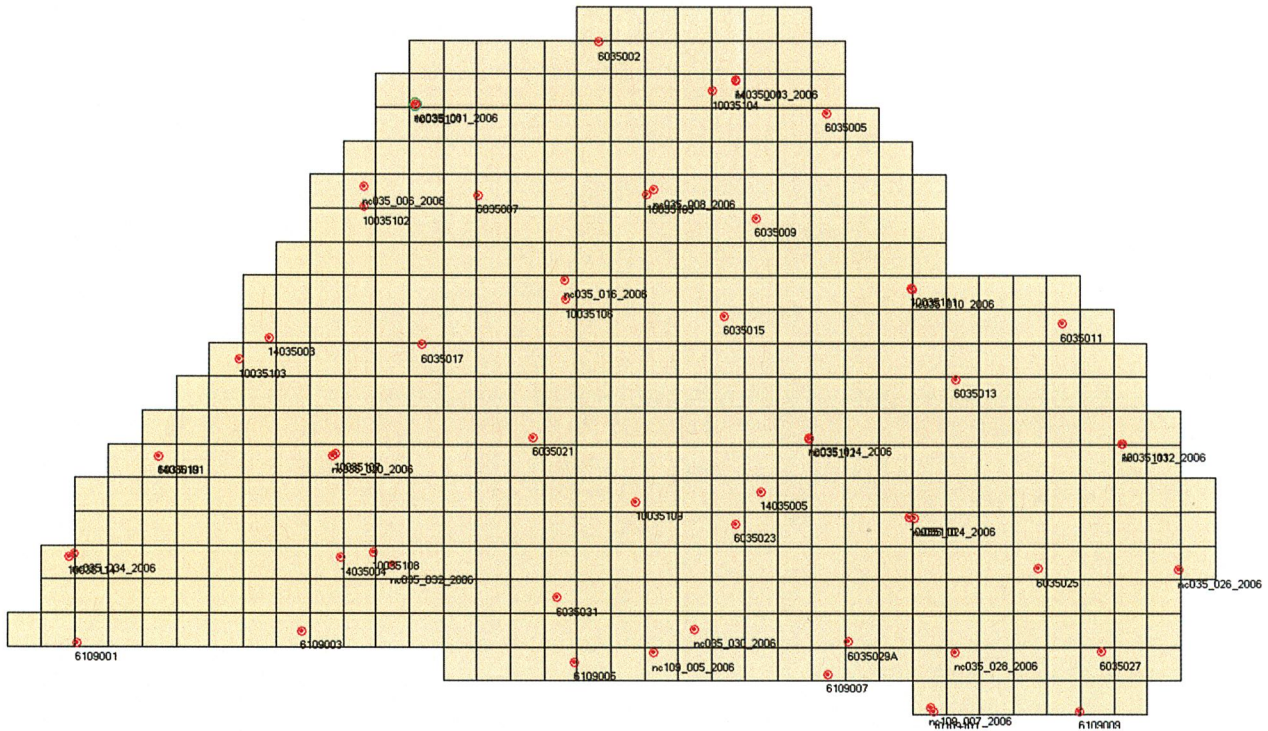
## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Aquisition: Start: 12/3/2018 Finish: 12/3/2018

## Metadata Information

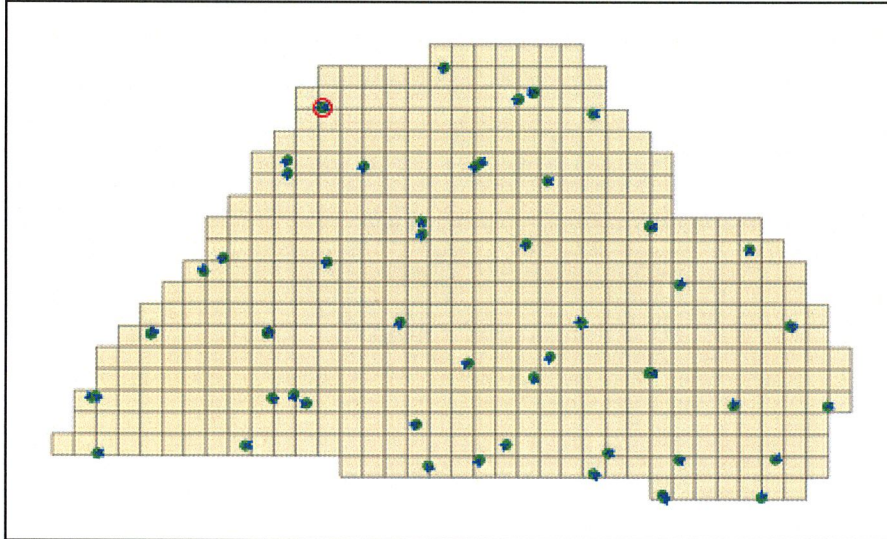
Index File Name: catawba\_tiles.shp  
# of Polygons: 496  
# of Matching Images: 496  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: I:\Catawba2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

## Tiled-Image Area



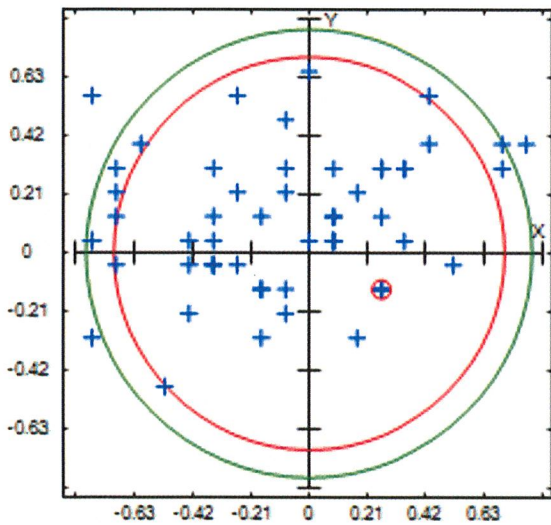


Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min $\Delta X$ :	-0.781
Min $\Delta Y$ :	-0.477
Max $\Delta X$ :	0.781
Max $\Delta Y$ :	0.651
Mean $\Delta X$ :	-0.088
Mean $\Delta Y$ :	0.115
RmseX:	0.415
RmseY:	0.27
RmseH:	0.495
NSSDA:	0.857
No. Obs.:	57
CE 90:	0.704
CE 95:	0.803
CI:	0.085



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## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Aquisition: Start: 12/3/2018 Finish: 12/3/2018

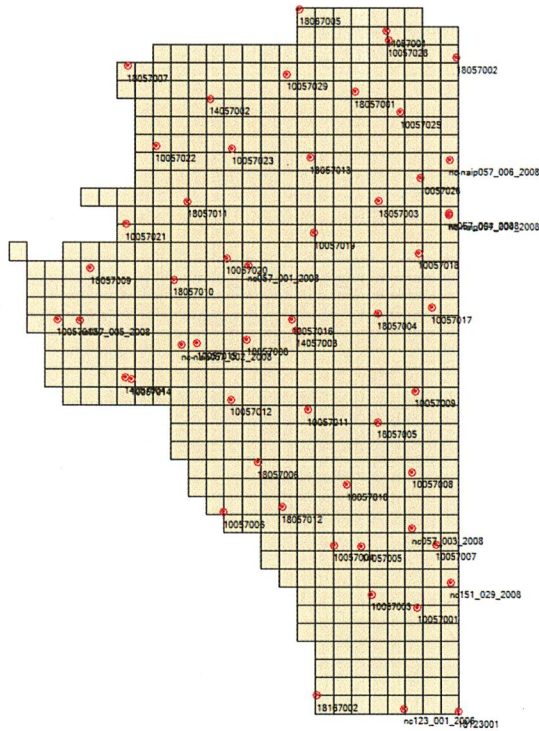
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## Metadata Information

Index File Name: davidson\_tiles.shp  
# of Polygons: 626  
# of Matching Images: 626  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: J:\Davidson2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

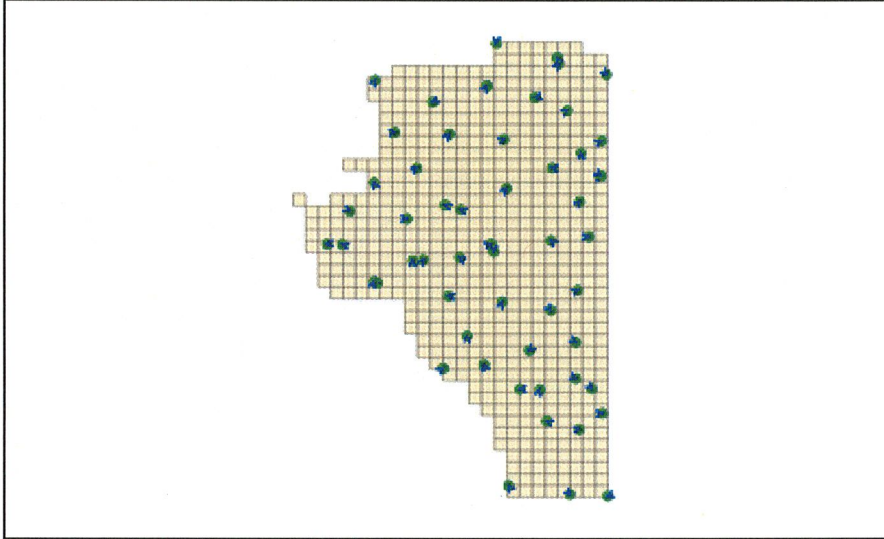
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## Tiled-Image Area



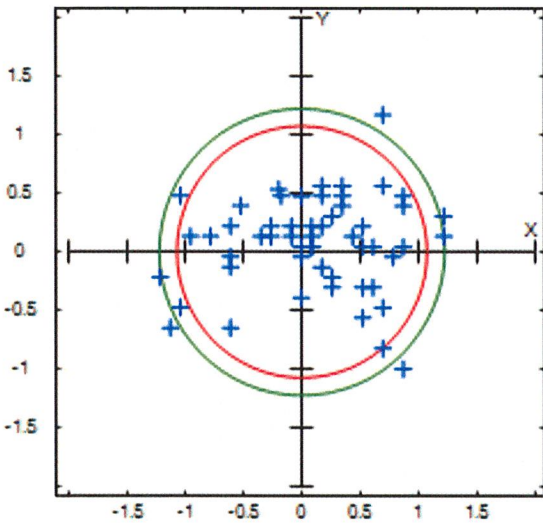


## Vector Offset



Scaling Factor: 200

## Circular Error



## Error Statistics

Min $\Delta X$ :	-1.215
Min $\Delta Y$ :	-0.998
Max $\Delta X$ :	1.215
Max $\Delta Y$ :	1.172
Mean $\Delta X$ :	0.101
Mean $\Delta Y$ :	0.079
RmseX:	0.599
RmseY:	0.408
RmseH:	0.725
NSSDA:	1.255
No. Obs.:	55
CE 90:	1.073
CE 95:	1.224
CI:	0.132



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## Project Information

Prepared By: Watson Ross  
Project Name: 2018 Ortho QC  
Sensor Info: NA  
Sensor Resolution: 0.5  
Vendor Name: NA  
Date of Acquisition: Start: 12/1/2018 Finish: 12/1/2018

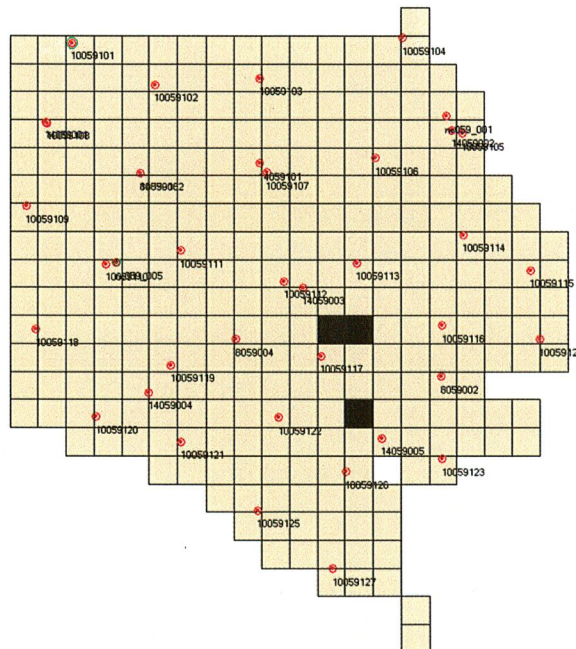
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## Metadata Information

Index File Name: davie\_files.shp  
# of Polygons: 306  
# of Matching Images: 306  
Polygon ID: tif\_name  
Units: Feet  
Image Folder Path: I:\Davie2018  
Threshold: Other: 1.5  
Scaling Used: 1:25050

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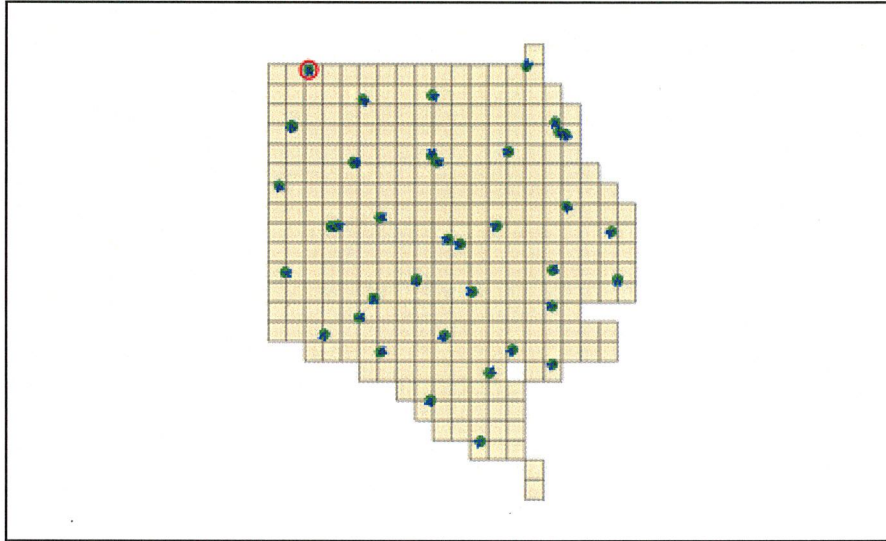
## Tiled-Image Area





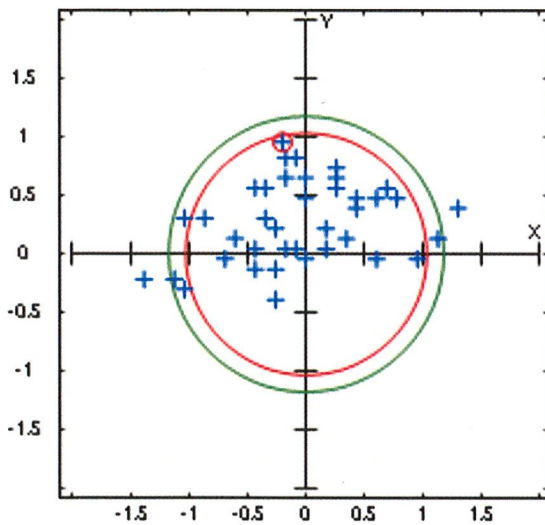


Vector Offset



Scaling Factor: 200

Circular Error



Error Statistics

Min $\Delta X$ :	-1.389
Min $\Delta Y$ :	-0.391
Max $\Delta X$ :	1.302
Max $\Delta Y$ :	0.957
Mean $\Delta X$ :	-0.052
Mean $\Delta Y$ :	0.272
RmseX:	0.612
RmseY:	0.435
RmseH:	0.751
NSSDA:	1.3
No. Obs.:	39
CE 90:	1.033
CE 95:	1.178
CI:	0.151



Station Name	PID	NAVD88			NAD83(2011) Epoch 2010.0			SPC Combined Factor
		Ellipsoid Height (m)	Orthometric Height (m)	Latitude DMS	Longitude DMS	SPC North (m)	SPC East (m)	
ALBEMARLE CORS ARP	DG5755	112.630	142.970	35 20 17.30339 N	080 12 48.52476 W	176846.600	499299.251	0.99985604
ASHEBORO 2 CORS ARP	DL6900	210.381	240.790	35 37 49.38501 N	079 45 53.75304 W	208859.939	540319.797	0.99986134
ASU-BOONE CORS ARP	DF4365	957.907	989.120	36 12 50.84473 N	081 40 54.64789 W	276616.959	368477.452	0.99986327
BEAUFORT CORS ARP	DK7561	-27.858	9.650	34 43 08.50895 N	076 40 18.99140 W	109995.822	822811.707	0.99991989
BODIE ISLAND CORS ARP	DO2877	-33.046	5.940	35 50 44.35730 N	075 33 48.94199 W	237848.248	919957.886	0.99993139
BRYSON CITY CORS ARP	DL2762	566.148	594.790	35 22 21.56251 N	083 30 23.37131 W	189293.916	200277.527	0.99978597
BURLINGTON CORS ARP	DF9213	173.401	203.610	36 05 29.58604 N	079 26 12.17620 W	259845.465	570271.809	0.99995269
BURNSVILLE 2007 CORS ARP	DL6201	748.693	778.830	35 54 29.30454 N	082 20 49.87834 W	244501.699	307532.708	0.99982060
BUXTON CORS ARP	DM5409	-25.445	13.270	35 15 58.08197 N	075 33 06.82885 W	173632.372	923246.647	0.99987661
CARTHAGE CORS ARP	DG5938	149.613	181.000	35 20 30.04880 N	079 23 05.08515 W	176632.942	574629.599	0.99985034
CASTLE HAYNE 2007 CORS ARP	DK7086	-22.806	13.900	34 20 40.22860 N	077 52 29.89892 W	66537.627	713112.699	1.00000050
CEDAR ISLAND CORS ARP	DL3071	-30.613	7.250	35 01 03.76013 N	076 18 55.28490 W	143939.877	854565.507	0.99988569
CLINTON CORS ARP	DK4041	23.862	58.490	34 59 25.65387 N	078 21 31.47816 W	137793.395	668139.845	0.99987918
CONCORD CORS ARP	DF7471	154.382	184.820	35 22 35.24392 N	080 33 51.11399 W	181542.684	467489.138	0.99985072
CRESWELL CORS ARP	DK7747	-28.220	8.918	35 54 56.93091 N	076 28 25.29176 W	243161.208	837585.924	0.99994407
DOBSON CORS ARP	DF5767	340.642	373.920	36 25 31.51455 N	080 43 11.71069 W	298143.588	455359.078	1.00002904
DUCK 3 CORS ARP	DK3334	-24.775	14.110	36 10 54.01098 N	075 45 04.79522 W	274539.934	901788.896	1.00000811
DURHAM COOP CORS ARP	DG9328	117.466	148.790	35 59 46.12942 N	078 53 58.03641 W	249177.805	618666.816	0.99993843
ELIZABETH CITY CORS ARP	DL6896	-29.750	7.600	36 20 28.79075 N	076 15 29.27386 W	290874.906	855730.326	1.00005810
ELIZABETHTOWN CORS ARP	DI1680	-9.537	25.460	34 39 13.60147 N	078 31 11.73447 W	100363.878	653606.669	0.99992817
FAYETTEVILLE 2006 CORS ARP	DH9594	16.914	50.450	35 02 02.48998 N	078 52 14.73160 W	142444.626	621393.108	0.99987712
FORT FISHER CORS ARP	DM3521	-29.165	8.320	33 57 38.26113 N	077 56 18.76581 W	23891.297	707718.933	1.00012861
FRANKLIN CORS ARP	DG4257	620.895	649.270	35 11 30.68622 N	083 23 41.74673 W	168802.916	209516.356	0.99977570
GASTON CORS ARP	DE8425	213.712	245.140	35 18 39.79151 N	081 11 19.54124 W	175361.640	410593.642	0.99983959
GATESVILLE CORS ARP	DL6898	-20.472	15.650	36 26 12.65517 N	076 43 16.51658 W	300420.808	813921.941	1.00008983
GOLDSBORO CORS ARP	DK5550	14.068	48.900	35 25 16.86892 N	078 03 30.57562 W	185808.939	695094.939	0.99987475
GREENVILLE NC CORS ARP	DL7337	4.907	40.810	35 36 18.30987 N	077 21 55.47952 W	207005.628	757690.324	0.99989078
HAYWOOD CORS ARP	DE8228	809.314	838.220	35 31 35.39633 N	082 55 30.12730 W	204104.221	253736.164	0.99975705
HENDERSONVILLE CORS ARP	DK7853	654.472	684.850	35 21 21.89173 N	082 30 03.99653 W	183772.967	291488.002	0.99977154
HICKORY CORS ARP	DM3523	326.299	358.470	35 44 31.01014 N	081 18 30.93483 W	223397.889	400811.751	0.99985789
HIGH POINT CORS ARP	AI4198	267.948	299.220	35 57 56.48686 N	080 00 48.93737 W	246260.723	518178.455	0.99990805
I77 WELCOME CNTR CORS ARP	DF6318	157.556	187.950	35 07 21.25422 N	080 54 58.46768 W	153944.753	434964.997	0.99985039
JACKSON NC CORS ARP	DH7133	13.257	47.680	36 24 30.56335 N	077 26 15.30879 W	296031.384	749749.096	1.00007439
JACKSONVILLE CORS ARP	DK6239	-26.125	10.950	34 44 46.81575 N	077 27 11.71789 W	111628.027	751216.799	0.99991534
JORDAN LAKE CORS ARP	DL3891	45.996	77.430	35 46 52.49646 N	079 02 03.92766 W	225330.877	606489.109	0.99990797
KENANSVILLE CORS ARP	DI1071	15.560	51.360	34 56 30.49763 N	077 58 49.94532 W	132685.360	702719.518	0.99988470
KINSTON CORS ARP	DM3989	-3.126	32.790	35 19 18.56728 N	077 36 49.27040 W	175242.563	735637.711	0.99987383
LEXINGTON CORS ARP	DG5757	194.102	225.340	35 48 53.14318 N	080 13 46.20206 W	229736.512	498497.891	0.99989030
LILLINGTON 2004 CORS ARP	DG5759	25.706	58.730	35 25 12.54674 N	078 48 40.33946 W	185286.626	626745.253	0.99987286
LUMBERTON CORS ARP	DI1682	15.824	49.560	34 37 36.33605 N	079 04 39.69481 W	97263.238	602477.201	0.99992918

Note: Published positional informaton of published Continuous Operating Reference Stations (CORS) are denoted in meters (m).

Station Name	PID	NAVD88		NAD83(2011) Epoch 2010.0			SPC East (m)	SPC Combined Factor
		Ellipsoid Height (m)	Orthometric Height (m)	Latitude DMS	Longitude DMS	SPC North (m)		
MARION CORS ARP	DE8230	366.984	398.800	35 39 13.38510 N	081 57 16.17206 W	215162.325	342120.619	0.99983954
MARSHALL CORS ARP	DG7400	560.633	590.850	35 48 47.31356 N	082 41 22.67321 W	235064.443	276250.707	0.99983251
MONROE CORS ARP	DF5880	144.332	174.600	34 58 54.77687 N	080 31 25.79009 W	137720.671	470484.517	0.99986097
MOORESVILLE CORS ARP	DH3838	266.205	297.570	35 34 46.87707 N	080 48 12.53662 W	204453.424	446161.276	0.99984714
MORGANTON CORS ARP	DH7137	344.831	377.000	35 42 27.07386 N	081 39 23.99857 W	220367.093	369236.777	0.99985003
MURPHY CORS ARP	DL1890	476.123	504.800	35 04 06.77760 N	083 57 59.36142 W	157594.804	156842.278	0.99980296
NASHVILLE CORS ARP	DK7576	34.500	68.960	35 58 09.06797 N	078 01 11.34161 W	246618.195	698006.712	0.99994546
NCSA SALISBURY CORS ARP	DN5840	174.906	206.250	35 42 41.69212 N	080 25 55.99488 W	218535.902	480015.188	0.99987726
NCSO SWANQUARTER2 CORS ARP	DQ9090	-29.912	8.020	35 23 40.93853 N	076 19 31.76835 W	185719.856	852514.443	0.99988038
NEW BERN NCGS CORS ARP	DN8739	-16.105	21.070	35 06 45.99769 N	077 06 14.29783 W	152823.201	782416.342	0.99987805
NEWLAND 2007 CORS ARP	DM3991	1124.527	1155.410	36 04 39.95811 N	081 54 40.29398 W	262073.985	347419.061	0.99979994
NORTH WILKESBORO CORS ARP	DK4047	270.426	303.570	36 09 59.27542 N	081 07 57.22423 W	270132.288	417741.217	0.99995750
PARI_OBS_NC_2008 CORS ARP	DM6192	880.094	909.630	35 12 06.96417 N	082 52 20.90284 W	167939.378	257095.138	0.99973486
PEA ISLAND CORS ARP	DG5313	-31.109	7.780	35 41 02.04056 N	075 28 56.35040 W	220170.749	927930.973	0.99990584
PITTSBORO CORS ARP	DE8234	102.804	133.850	35 43 11.21331 N	079 10 38.62673 W	218525.196	593551.641	0.99988974
POLKTON CORS ARP	DG7402	84.929	115.530	34 59 33.17297 N	080 10 37.85763 W	138473.153	502143.744	0.99986944
RALEIGH CORS ARP	AJ2913	142.997	175.910	35 47 12.85298 N	078 38 19.41118 W	226017.117	642259.673	0.99989367
RALEIGH DOT CORS ARP	DG4687	51.789	85.040	35 45 49.50795 N	078 34 44.39448 W	223469.874	647669.715	0.99990429
REIDSVILLE CORS ARP	DM3525	234.815	266.700	36 21 42.71489 N	079 39 56.54007 W	289954.707	549851.005	1.00002348
ROBBINSVILLE CORS ARP	DM3993	606.659	635.150	35 19 15.69235 N	083 47 48.68948 W	184808.885	173646.886	0.99977812
ROCKINGHAM CORS ARP	DM3995	91.872	122.950	34 57 51.98780 N	079 47 47.74087 W	135010.039	536859.244	0.99987067
ROXBORO CORS ARP	DM3527	194.654	225.650	36 23 28.05620 N	078 59 54.41890 W	293001.606	609740.318	1.00003983
SANFORD CORS ARP	AM7024	95.450	127.140	35 28 24.67784 N	079 09 28.98436 W	191202.330	595258.352	0.99986507
SHALLOTTE CORS ARP	DK3336	-10.002	25.750	33 58 57.20129 N	078 23 24.30664 W	25972.444	665965.745	1.00011715
SHELBY CORS ARP	DG7404	264.465	296.210	35 16 53.64241 N	081 29 28.11569 W	172739.799	383023.692	0.99983123
SMITHFIELD CORS ARP	DK6525	24.469	58.660	35 33 49.60980 N	078 20 10.80495 W	201405.073	669760.307	0.99988353
SPARTA CORS ARP	DL1707	839.991	871.970	36 29 51.90632 N	081 06 52.93270 W	306852.726	420130.758	0.99997742
SPINDALE CORS ARP	DK4043	302.765	334.650	35 21 55.83430 N	081 54 57.34807 W	183099.887	344671.752	0.99982704
STATESVILLE CORS ARP	DK7549	228.842	261.190	35 51 19.72891 N	080 50 55.47790 W	235120.895	442629.732	0.99989208
SW COMMUNITY COLL CORS ARP	DH3874	645.113	673.650	35 20 52.40748 N	083 12 23.38897 W	185353.255	227392.744	0.99977276
SWANNANOVA CORS ARP	DG5311	659.842	689.830	35 35 46.03847 N	082 25 24.22964 W	210140.053	299464.372	0.99978706
SWANQUARTER CORS ARP	DL1892	-30.398	7.510	35 23 40.86368 N	076 19 33.37884 W	185716.456	852473.883	0.99988046
TARBORO CORS ARP	DK7578	-0.513	34.830	35 52 56.96198 N	077 34 21.39610 W	237489.266	738477.556	0.99993315
TROY CORS ARP	DK4045	144.044	174.590	35 22 01.84517 N	079 52 12.77094 W	179740.437	530528.389	0.99985200
WALNUT COVE CORS ARP	DL1894	276.319	309.540	36 22 19.68806 N	080 11 05.62514 W	291528.706	503266.558	1.00002046
WARRENTON CORS ARP	DM3529	76.208	109.530	36 23 41.68571 N	078 10 13.74958 W	293732.691	684023.061	1.00005974
WASHINGTON 2007 CORS ARP	DK7551	-25.416	11.220	35 33 34.78484 N	077 03 31.44193 W	202467.748	785569.672	0.99989097
WASHINGTON CORS ARP	AJ2915	-25.317	11.260	35 33 34.80249 N	077 03 31.54255 W	202468.242	785567.128	0.99989095
WEST JEFFERSON CORS ARP	DL2082	934.802	966.060	36 23 34.94821 N	081 28 42.26843 W	295989.718	387260.230	0.99992435
WHITEVILLE CORS ARP	DJ8943	-2.342	32.360	34 16 49.59006 N	078 42 59.33169 W	58881.567	635708.028	1.00001544
WILLIAMSTON 2 CORS ARP	DN8741	-21.901	14.180	35 49 49.75739 N	077 02 06.20973 W	232550.205	787120.808	0.99992694
WILLIAMSTON CORS ARP	DF8715	-20.544	15.530	35 49 48.75037 N	077 02 04.93157 W	232519.811	787153.494	0.99992667
WILMINGTON CORS ARP	AJ2917	-24.775		34 14 09.45795 N	077 55 45.16083 W	54442.078	708252.321	1.00003228
WILSON CORS ARP	DK7563	11.179	46.030	35 42 26.29637 N	077 55 57.08393 W	217645.964	706192.128	0.99990236
WINSTON SALEM CORS ARP	DH5853	254.046	286.560	36 04 15.67829 N	080 13 37.75017 W	258164.236	499061.500	0.99993484

Note: Published positional informaton of published Continuous Operating Reference Stations (CORS) are denoted in meters (m).

## Acronyms, Abbreviations, and Definitions

ARP - Antenna Reference Point

CORS - Continuous Operating Reference Station

DMS - Degrees Minutes Seconds

m – Meter

PID - Permanent Identifier

SPC - State Plane Coordinates

### Statistical Definitions:

**Min  $\Delta X$  /  $\Delta Y$**  – These statistics represent the change in value between the X(Y)-coordinate location in the photo and X(Y)-coordinate location in the survey. The minimum of each simply represents the smallest value out of all of the analyzed locations. This component of the statistics can be used to show which user entered locations most closely correspond to the surveyed points.

**Max  $\Delta X$  /  $\Delta Y$**  – These statistics represent the change in value between the X(Y)-coordinate location in the photo and X(Y)-coordinate location in the survey. The maximum value of each represents the largest value out of all of the analyzed locations. Maximum values can be used to show which user entered locations most closely correspond to the surveyed points.

**Mean  $\Delta X$  /  $\Delta Y$**  - The statistics of the mean  $\Delta X$  and mean  $\Delta Y$  are intended to show the average values of the  $\Delta X$  and  $\Delta Y$ . These statistics show the change in value between the X(Y)-coordinate location in the photo and X(Y)-coordinate location in the survey. The mean values can be used to show the average off-sets of all of the analyzed locations

**RMSE X / Y / H** - The RMSE is used to describe accuracy encompassing both random and systematic errors. RMSE is the square root of the square of the difference between a true test point and an interpolated test point divided by the total number of test points in the arithmetic mean. RMSE X measures RMSE in the X direction only, and similarly RMSE Y measures RMSE in the Y direction only. RMSE H takes both X and Y directions into account, and measures the RMSE in a straight line between the true test point and the interpolated test point.

**NSSDA** – Horizontal accuracy standard adopted by the National Standard for Spatial Data Accuracy, computed utilizing the  $RMSE_x$  and  $RMSE_y$  values.

**No. Obs.** – Number of observations

**CE 90 and CE 95** - Circular Error probable, defined as a circle, centered about the mean, whose boundary is expected to include a certain percentage of the population within it. In the case of CE90, 90% of the population is expected to be included within the circular radius and in the case of CE95, 95% of the population is expected to be included within the circular radius.

**CI** – Confidence Interval, which describes the uncertainty associated with a sampling method.