



# North Carolina Department of Public Safety

Emergency Management  
North Carolina Geodetic Survey

Pat McCrory, Governor  
Frank L. Perry, Secretary

Michael A. Sprayberry, Director

## LiDAR Quality Control Report – 2014 Statewide LiDAR Project

The North Carolina Geodetic Survey performed a vertical quality control (QC) survey in Phase 2 of the statewide LiDAR elevation project. The purpose of the survey was to test the elevation points contained in a dataset that was obtained by utilizing airborne Light Detection And Ranging (LiDAR) technology. The attached report contains the results of the vertical QC survey.


The QC test points were collected utilizing the North Carolina Real Time Network (NCRTN), and with conventional survey methods in areas unsuitable for GNSS observations.

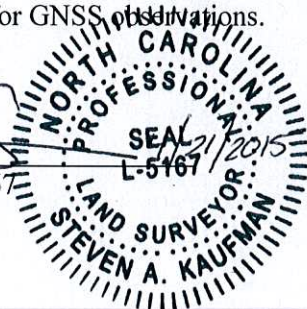
The field survey data that was used to generate the attached report was performed by five (5) firms that are licensed by the NC Board of Examiners for Engineers and Surveyors. Each of these firms provided a signed and sealed report that included all of the data that they collected under the responsible charge of a North Carolina Professional Land Surveyor. Some of the quality control points were collected by the North Carolina Geodetic Survey (NCGS) under the supervision of Joe Scott (L-3254). The review of the field data and the generation of the final QC report were performed under the supervision of Steve Kaufman (L-5167).

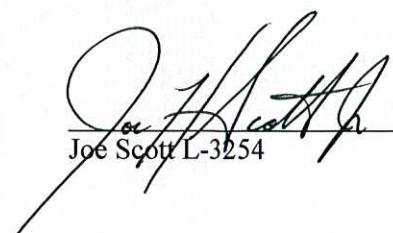
The GNSS portion of the survey (performed by NCGS) was performed to the following parameters:


<b>Class of survey:</b>	Class B
<b>Positional accuracy:</b>	Vertical 0.04 USft Horizontal 0.02 USft
<b>Type of field procedure used:</b>	NCRTN, OPUS, and traditional trigonometric leveling
<b>Dates of survey:</b>	August 4, 2014 – April 9, 2015
<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>Published fixed control used:</b>	North Carolina Continuously Operating Reference Station (CORS) Network and NCRTN
<b>Geoid model:</b>	Geoid12A
<b>Combined grid factor:</b>	See attached control datasheets
<b>Units:</b>	US Survey Feet

Trigonometric leveling was performed to Class C (56.1605) standards at any QC point that was in a location not suitable for GNSS observations.

  
Steve Kaufman L-5167



  
Joe Scott L-3254



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## 2014 Phase 2 NC LiDAR Independent Quality Control Summary

### Non-Vegetated Area

<i>County</i>	<i>NVA Type</i>	<i>NVA Minimum DZ</i>	<i>NVA Maximum DZ</i>	<i>NVA Mean DZ</i>	<i>NVA Mean Magnitude DZ</i>	<i>NVA Observations</i>	<i>NVA Standard Deviation DZ</i>	<i>NVA RMSE Z</i>	<i>95% Confidence Level Z</i>
Bladen	2B, 2U	-0.364	0.313	-0.019	0.380	55	0.177	0.176	0.345
Brunswick	2B, 2U	-0.804	0.568	-0.038	0.429	55	0.243	0.243	0.477
Columbus	2B, 2U	-0.791	0.579	-0.108	0.488	58	0.274	0.292	0.573
Duplin	2U, 2B	-0.373	0.524	0.031	0.420	61	0.217	0.217	0.426
Edgecombe	2U, 2B	-0.278	0.771	0.141	0.450	46	0.236	0.272	0.534
Franklin	2U, 2B	-0.254	0.248	0.029	0.338	39	0.131	0.132	0.259
Greene	2U, 2B	-0.115	0.631	0.132	0.391	20	0.174	0.215	0.421
Halifax	2U, 2B	-0.301	0.465	0.143	0.427	64	0.163	0.216	0.424
Johnston	2U, 2B	-0.332	0.746	0.026	0.375	56	0.185	0.185	0.363
Lenoir	2U, 2B	-0.466	0.358	0.051	0.394	40	0.196	0.200	0.392
Nash	2U, 2B	-0.298	0.359	0.044	0.386	40	0.174	0.177	0.348
New Hanover	2B, 2U	-0.326	0.576	0.000	0.425	25	0.230	0.226	0.442
Northampton	2B, 2U	-0.090	0.389	0.153	0.401	55	0.110	0.188	0.368
Pender	2B, 2U	-0.307	0.371	0.040	0.383	61	0.179	0.182	0.357
Robeson	2B, 2U	-0.504	0.533	-0.026	0.408	58	0.209	0.209	0.409
Sampson	2B, 2U	-0.469	0.301	-0.034	0.370	57	0.171	0.173	0.338
Vance	2U, 2B	-0.184	0.313	0.115	0.369	22	0.114	0.160	0.314
Warren	2U, 2B	-0.832	0.360	0.076	0.409	30	0.217	0.226	0.443
Wayne	2U, 2H	-0.602	0.747	-0.050	0.466	27	0.272	0.271	0.532
Wilson	2U, 2B	-0.220	0.897	0.166	0.433	40	0.184	0.247	0.483

### Vegetated Area

<i>County</i>	<i>VVA Class</i>	<i>VVA Minimum DZ</i>	<i>VVA Maximum DZ</i>	<i>VVA Mean DZ</i>	<i>VVA Mean Magnitude DZ</i>	<i>VVA Observations</i>	<i>VVA Standard Deviation DZ</i>	<i>VVA RMSE Z</i>	<i>95th Percentile</i>
Bladen	2L, 2M, 2H	-0.748	1.782	0.270	0.577	45	0.410	0.487	0.965
Brunswick	2L, 2M, 2H	-0.458	0.465	0.007	0.446	45	0.249	0.246	0.437
Columbus	2L, 2M, 2H	-0.578	1.361	0.090	0.518	43	0.372	0.379	0.789
Duplin	2L, 2M, 2H	-0.264	0.990	0.140	0.461	40	0.273	0.304	0.788
Edgecombe	2H, 2L, 2M	-0.061	0.790	0.327	0.576	25	0.259	0.414	0.767
Franklin	2L, 2H, 2M	-0.360	0.752	0.176	0.483	25	0.224	0.282	0.472
Greene	2L, 2H, 2M	-0.140	0.685	0.260	0.542	20	0.251	0.357	0.668
Halifax	2H, 2M, 2L	-0.128	0.958	0.307	0.561	35	0.224	0.378	0.709
Johnston	2H, 2L, 2M	-0.232	0.843	0.176	0.498	40	0.260	0.312	0.595
Lenoir	2L, 2H, 2M	-0.229	1.030	0.318	0.592	22	0.323	0.448	0.962
Nash	2H, 2L, 2M	-1.055	0.778	0.173	0.532	25	0.338	0.374	0.734
New Hanover	2L, 2M, 2H	-0.354	0.585	0.096	0.480	15	0.279	0.286	0.547
Northampton	2H, 2L, 2M	-0.145	0.600	0.254	0.520	23	0.191	0.316	0.578
Pender	2M, 2L, 2H	-0.297	0.835	0.127	0.441	45	0.217	0.250	0.443
Robeson	2L, 2M, 2H	-4.004	0.904	-0.044	0.516	45	0.653	0.647	0.625
Sampson	2H, 2M, 2L	-0.488	1.159	0.052	0.464	44	0.303	0.304	0.567
Vance	2H, 2L, 2M	0.000	0.749	0.256	0.506	18	0.187	0.314	0.550
Warren	2H, 2L, 2M	-0.143	0.527	0.144	0.443	20	0.222	0.260	0.494
Wayne	2B, 2L, 2M	-0.458	0.579	-0.023	0.409	33	0.211	0.210	0.384
Wilson	2L, 2H, 2M	-0.221	0.893	0.324	0.588	20	0.260	0.411	0.801

#### Project Results

NVA		VVA	
Project NVA RMSE:	0.212'	Project VVA RMSE:	0.384'
Project NVA 95% Confidence:	0.415'	Project VVA 95th Precintile:	0.745'

## NORTH CAROLINA GEODETIC SURVEY

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## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 2  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 1/20/2015 Finish: 1/20/2015

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## Metadata Information

### Tile Index:

Path: I:\11212014\_NCFMP\_Delivery5\BladenCoNC\Tile\_Scheme\bladen2.shp

Number of Polys: 0

### Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### LAS:

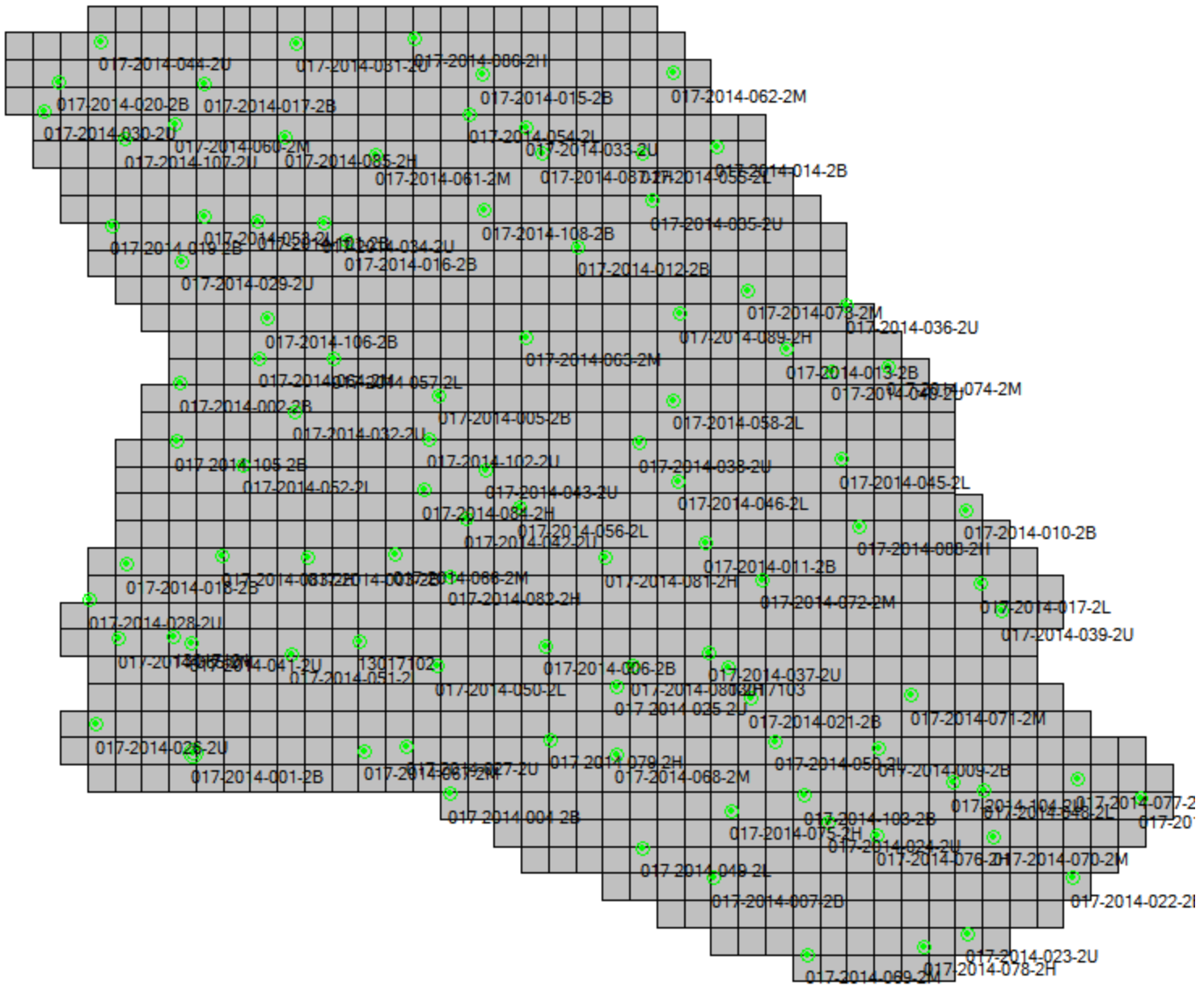
Tile Index Attribute: FileName

Path to Data: I:\11212014\_NCFMP\_Delivery5\BladenCoNC\Masspoints

Number of Data Files Matching Attribute: 1015 out of 1015



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	100			
2B	30	0.310	0.318	
2U	25	0.383	0.321	
2L	15		0.798	0.798
2M	15		0.814	0.814
2H	15		1.337	1.337
Total	100			

Units: US Survey Feet

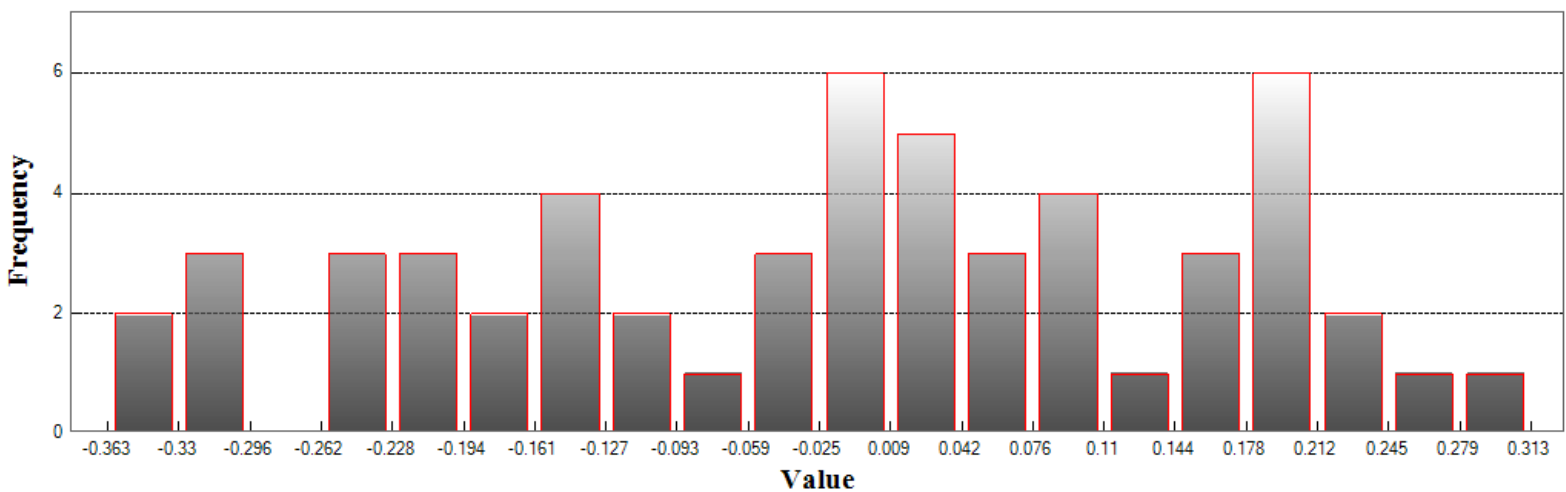


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2B, 2U  
Minimum DZ: -0.364  
Maximum DZ: 0.313  
Mean DZ: -0.019  
Mean Magnitude DZ: 0.38  
Number Observations: 55  
Standard Deviation DZ: 0.177  
RMSE Z: 0.176  
95% Confidence Level Z: 0.345  
Units: US Survey Feet

# Histogram



Min: -0.364  
Max: 0.313  
Number Of Bins: 20  
Bin Interval: 0.034

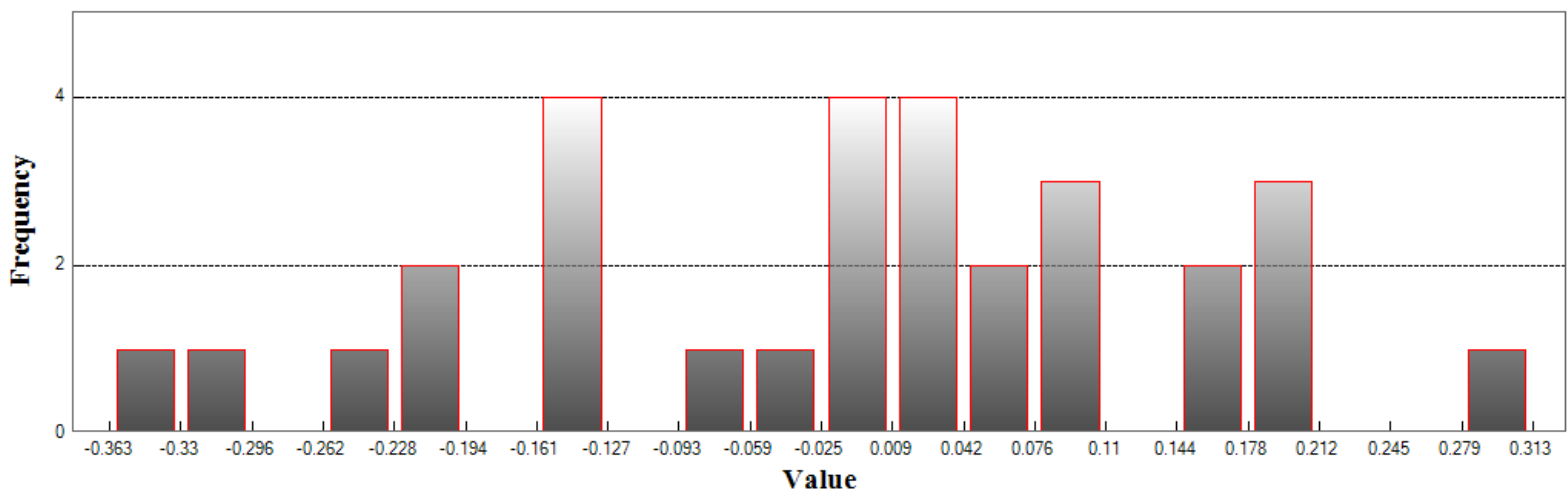


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.364  
Maximum DZ: 0.313  
Mean DZ: -0.014  
Mean Magnitude DZ: 0.351  
Number Observations: 30  
Standard Deviation DZ: 0.16  
RMSE Z: 0.158  
95th Percentile: 0.318  
Units: US Survey Feet

## Histogram



Min: -0.364

Max: 0.313

Number Of Bins: 20

Bin Interval: 0.034

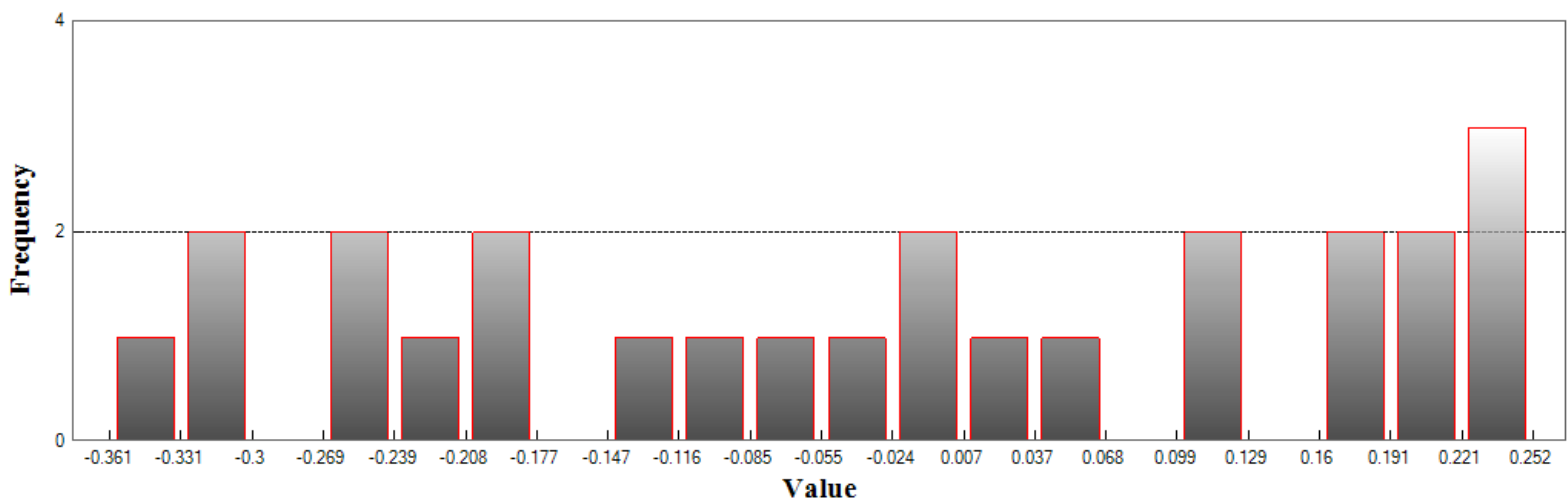


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.361  
Maximum DZ: 0.252  
Mean DZ: -0.026  
Mean Magnitude DZ: 0.412  
Number Observations: 25  
Standard Deviation DZ: 0.198  
RMSE Z: 0.196  
95th Percentile: 0.321  
Units: US Survey Feet

## Histogram



Min: -0.361

Max: 0.252

Number Of Bins: 20

Bin Interval: 0.031



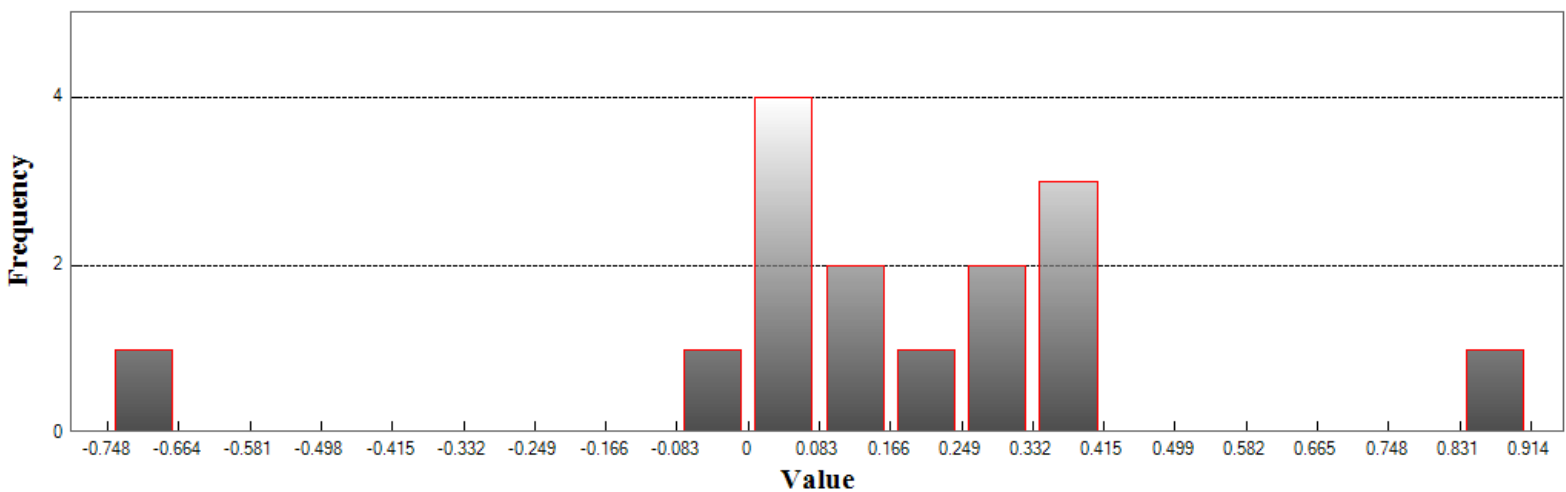


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.748  
Maximum DZ: 0.913  
Mean DZ: 0.16  
Mean Magnitude DZ: 0.515  
Number Observations: 15  
Standard Deviation DZ: 0.342  
RMSE Z: 0.367  
95th Percentile: 0.798  
Units: US Survey Feet

## Histogram



Min: -0.748

Max: 0.913

Number Of Bins: 20

Bin Interval: 0.083

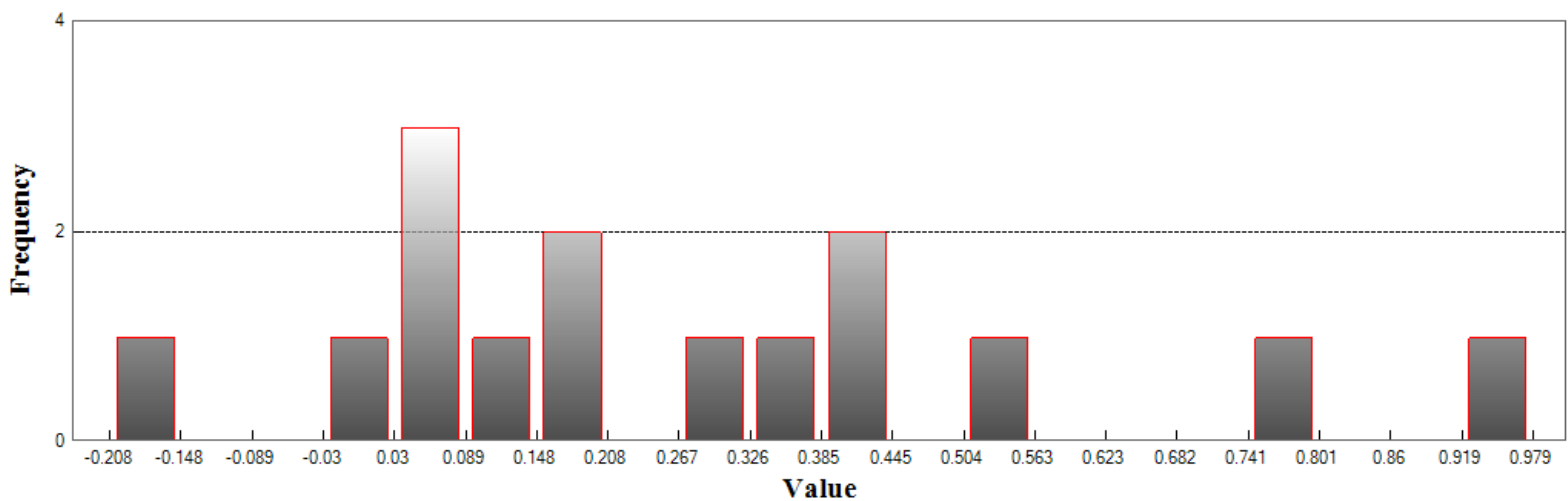


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.208  
Maximum DZ: 0.978  
Mean DZ: 0.283  
Mean Magnitude DZ: 0.558  
Number Observations: 15  
Standard Deviation DZ: 0.308  
RMSE Z: 0.411  
95th Percentile: 0.814  
Units: US Survey Feet

## Histogram



Min: -0.208

Max: 0.978

Number Of Bins: 20

Bin Interval: 0.059

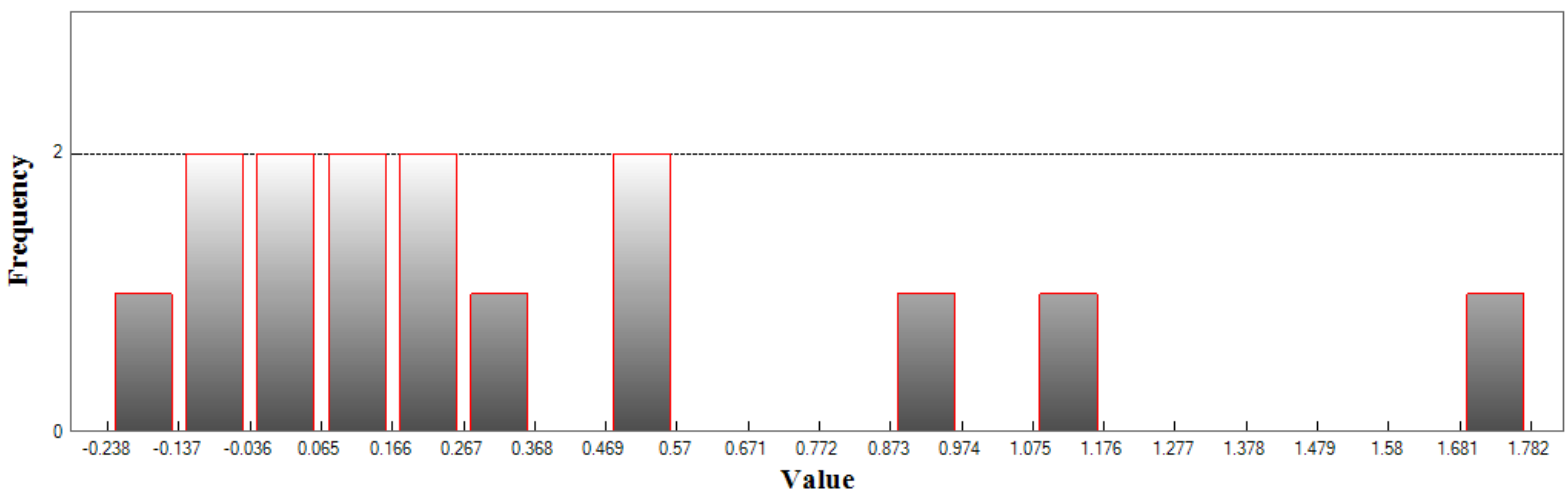


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.239  
Maximum DZ: 1.782  
Mean DZ: 0.367  
Mean Magnitude DZ: 0.651  
Number Observations: 15  
Standard Deviation DZ: 0.542  
RMSE Z: 0.64  
95th Percentile: 1.337  
Units: US Survey Feet

## Histogram



Min: -0.239

Max: 1.782

Number Of Bins: 20

Bin Interval: 0.101



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2M, 2H

Minimum DZ: -0.748

Maximum DZ: 1.782

Mean DZ: 0.27

Mean Magnitude DZ: 0.577

Number Observations: 45

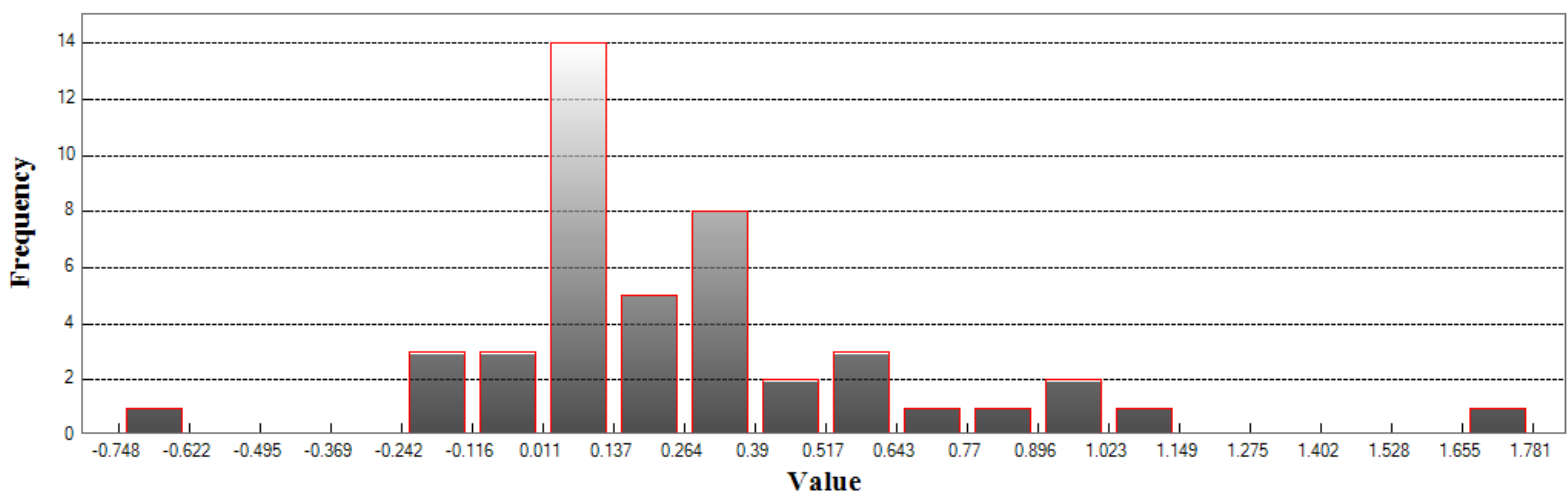
Standard Deviation DZ: 0.41

RMSE Z: 0.487

95th Percentile: 0.965

Units: US Survey Feet

## Histogram



Min: -0.748

Max: 1.782

Number Of Bins: 20

Bin Interval: 0.126



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## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 2  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 1/20/2015 Finish: 1/20/2015

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## Metadata Information

### Tile Index:

Path: I:\11212014\_NCFMP\_Delivery5\BrunswickCoNC\Tile\_Scheme\Brunswick2.shp  
Number of Polys: 0

### Intensity:

Tile Index Attribute: Not Specified  
Path to Data: Not Specified  
Number of Data Files Matching Attribute: Not Specified

### DEM:

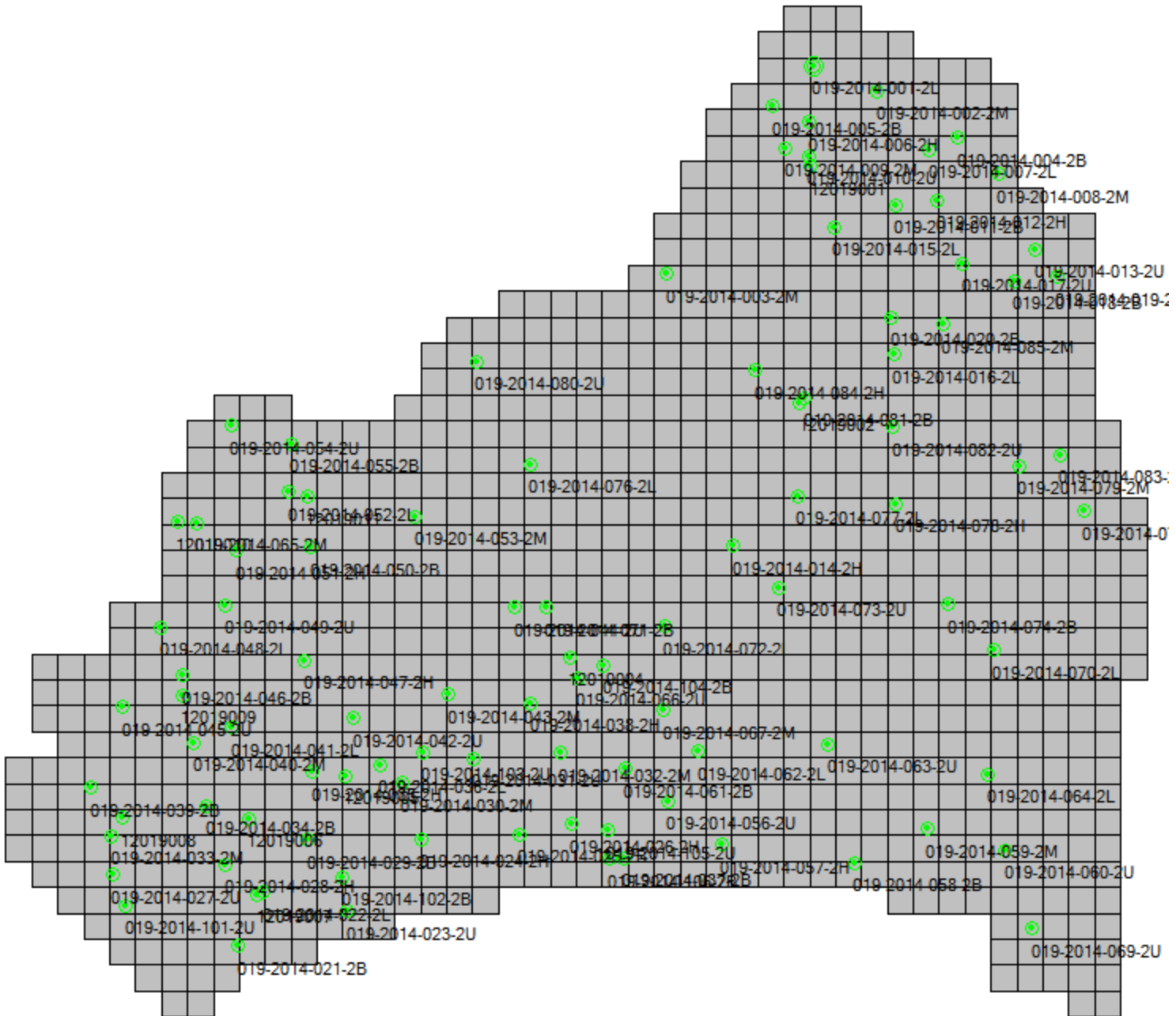
Tile Index Attribute: Not Specified  
Path to Data: Not Specified  
Number of Data Files Matching Attribute: Not Specified

### LAS:

Tile Index Attribute: FileName  
Path to Data: I:\11212014\_NCFMP\_Delivery5\BrunswickCoNC\Masspoints  
Number of Data Files Matching Attribute: Not Specified



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	100			
2L	15		0.416	0.416
2M	15		0.412	0.412
2B	22	0.485	0.467	
2H	15		0.411	0.411
2U	33	0.472	0.441	
Total	100			

Units: US Survey Feet



# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.804

Maximum DZ: 0.568

Mean DZ: -0.038

Mean Magnitude DZ: 0.429

Number Observations: 55

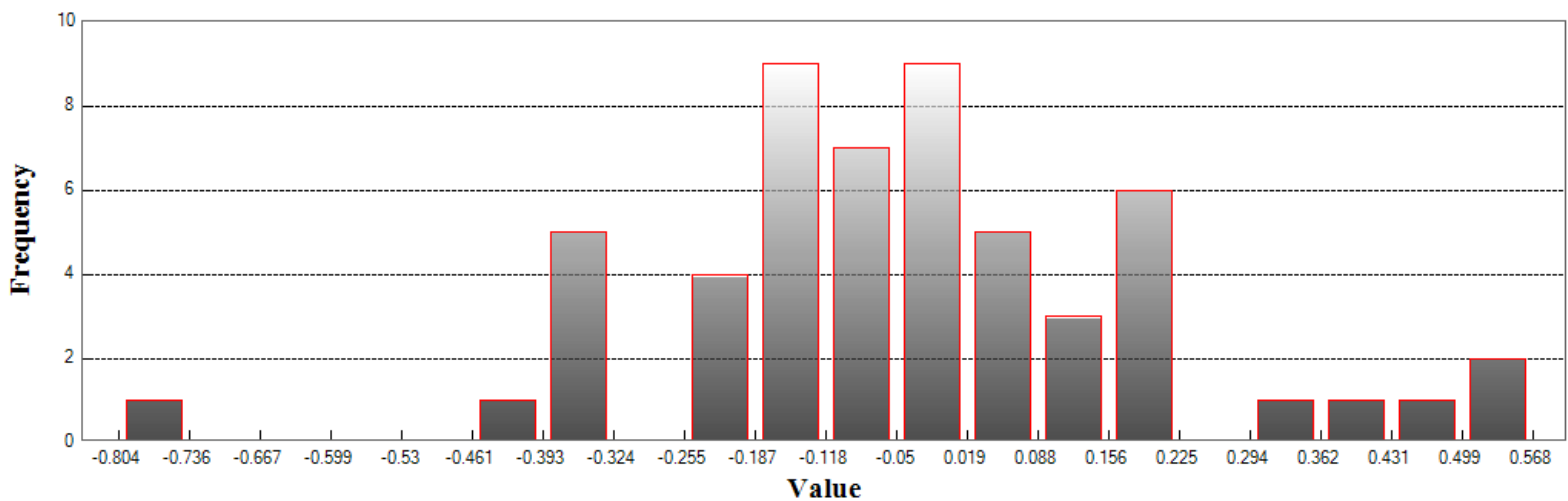
Standard Deviation DZ: 0.243

RMSE Z: 0.243

95% Confidence Level Z: 0.477

Units: US Survey Feet

# Histogram



Min: -0.804

Max: 0.568

Number Of Bins: 20

Bin Interval: 0.069



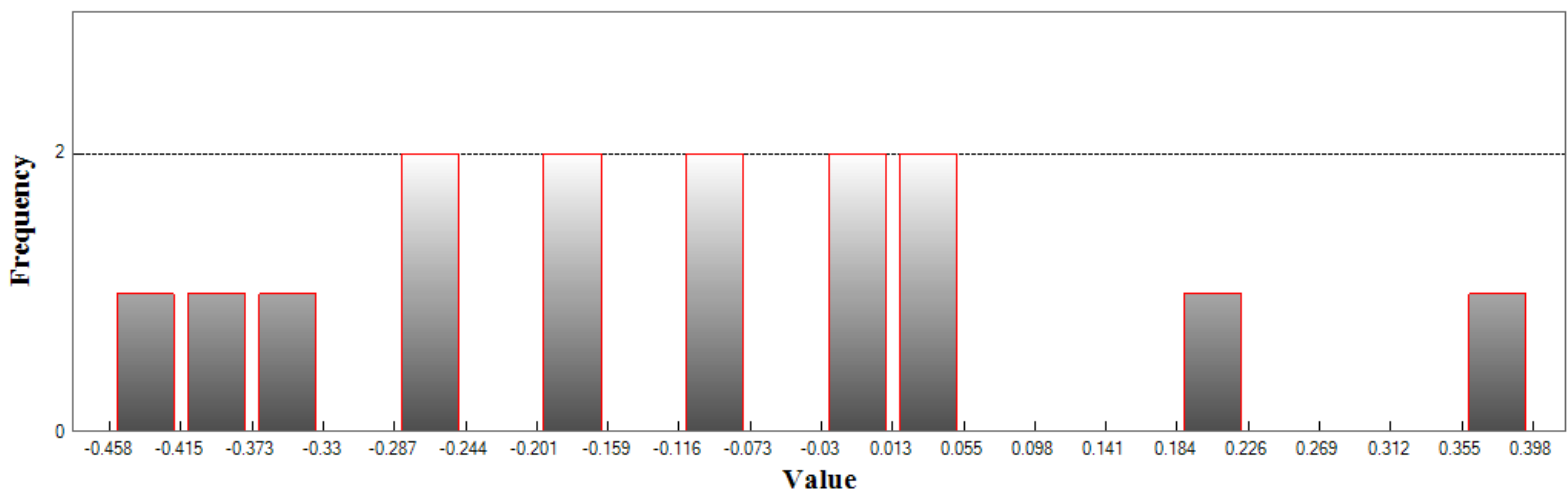


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.458  
Maximum DZ: 0.398  
Mean DZ: -0.111  
Mean Magnitude DZ: 0.45  
Number Observations: 15  
Standard Deviation DZ: 0.231  
RMSE Z: 0.249  
95th Percentile: 0.416  
Units: US Survey Feet

## Histogram



Min: -0.458

Max: 0.398

Number Of Bins: 20

Bin Interval: 0.043

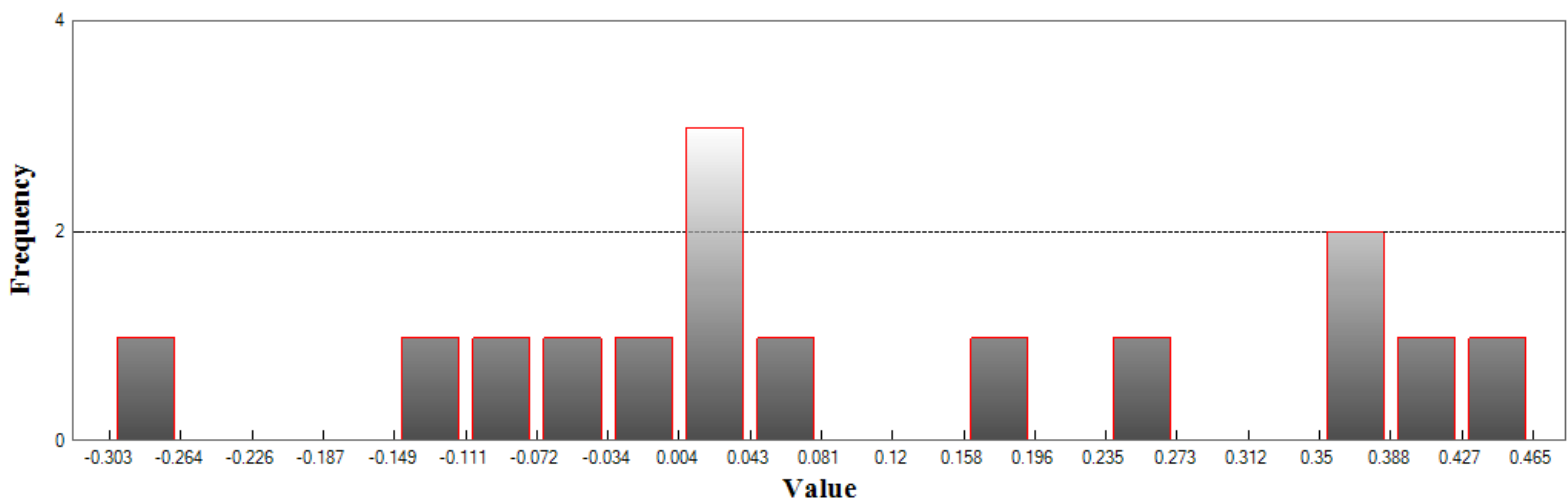


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.302  
Maximum DZ: 0.465  
Mean DZ: 0.11  
Mean Magnitude DZ: 0.432  
Number Observations: 15  
Standard Deviation DZ: 0.224  
RMSE Z: 0.243  
95th Percentile: 0.412  
Units: US Survey Feet

## Histogram



Min: -0.302  
Max: 0.465  
Number Of Bins: 20  
Bin Interval: 0.038

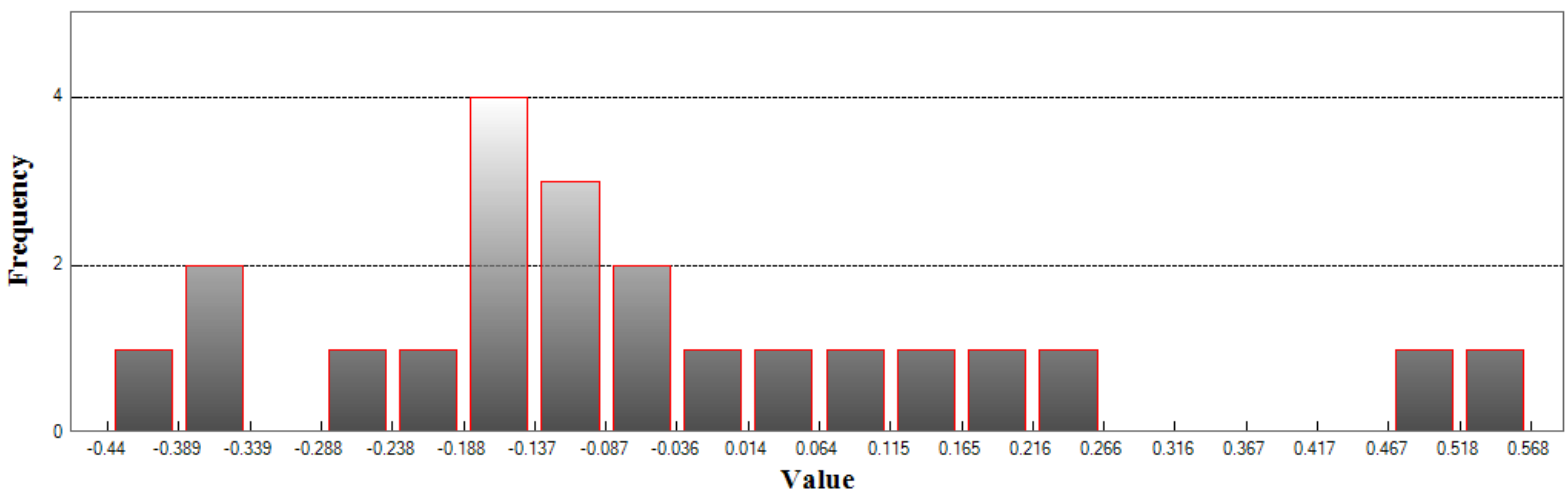


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.439  
Maximum DZ: 0.568  
Mean DZ: -0.044  
Mean Magnitude DZ: 0.448  
Number Observations: 22  
Standard Deviation DZ: 0.249  
RMSE Z: 0.248  
95th Percentile: 0.467  
Units: US Survey Feet

## Histogram



Min: -0.439

Max: 0.568

Number Of Bins: 20

Bin Interval: 0.05

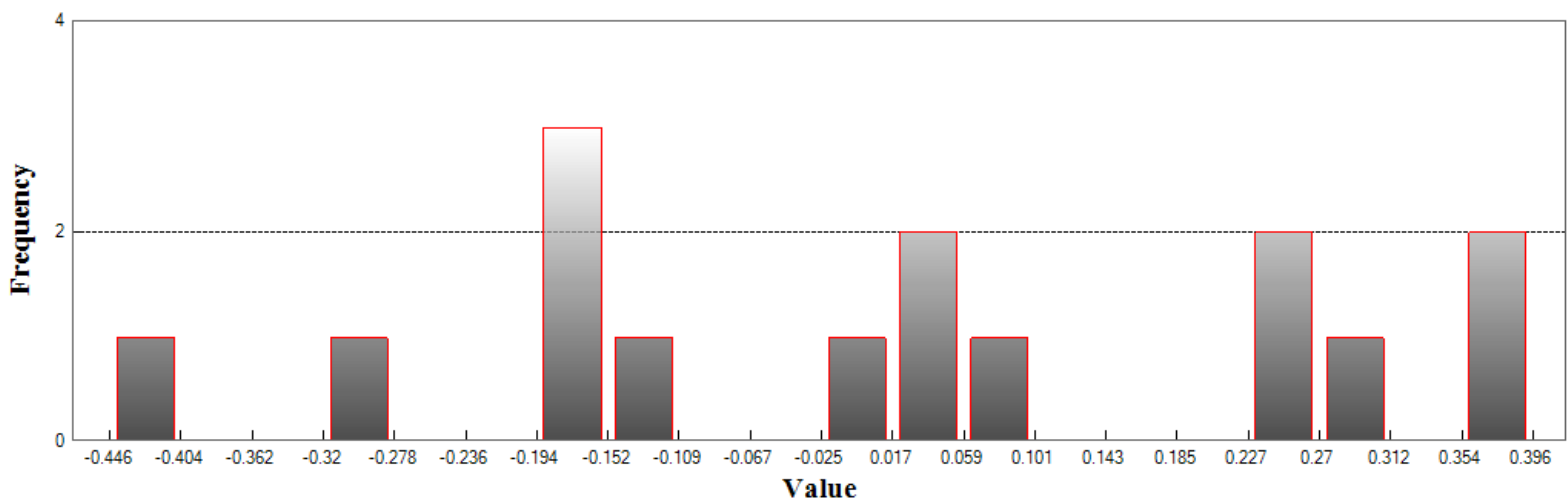


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.446  
Maximum DZ: 0.396  
Mean DZ: 0.021  
Mean Magnitude DZ: 0.456  
Number Observations: 15  
Standard Deviation DZ: 0.254  
RMSE Z: 0.246  
95th Percentile: 0.411  
Units: US Survey Feet

## Histogram



Min: -0.446

Max: 0.396

Number Of Bins: 20

Bin Interval: 0.042

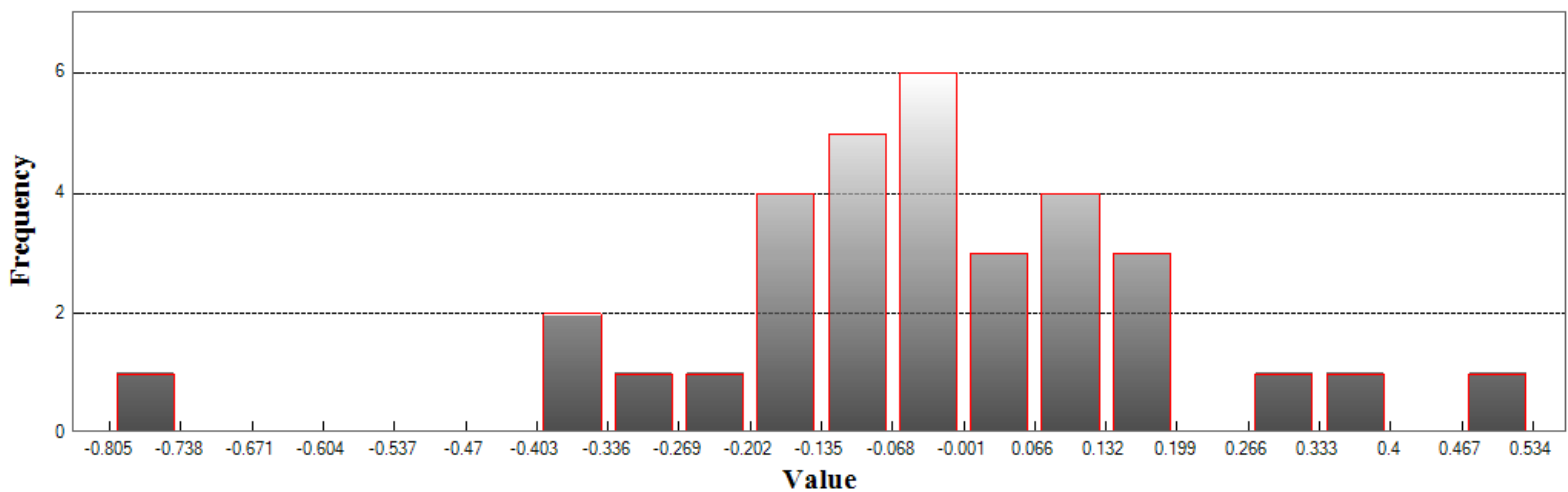


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.804  
Maximum DZ: 0.535  
Mean DZ: -0.033  
Mean Magnitude DZ: 0.415  
Number Observations: 33  
Standard Deviation DZ: 0.242  
RMSE Z: 0.241  
95th Percentile: 0.441  
Units: US Survey Feet

## Histogram



Min: -0.804

Max: 0.535

Number Of Bins: 20

Bin Interval: 0.067



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2M, 2H

Minimum DZ: -0.458

Maximum DZ: 0.465

Mean DZ: 0.007

Mean Magnitude DZ: 0.446

Number Observations: 45

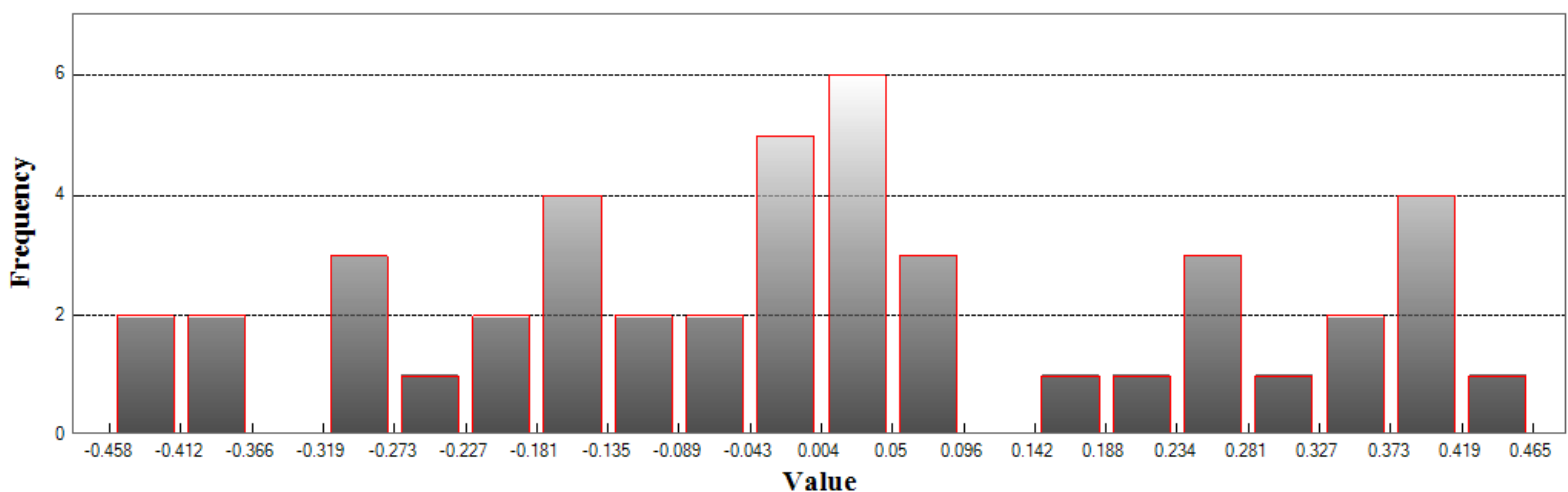
Standard Deviation DZ: 0.249

RMSE Z: 0.246

95th Percentile: 0.437

Units: US Survey Feet

## Histogram



Min: -0.458

Max: 0.465

Number Of Bins: 20

Bin Interval: 0.046

## NORTH CAROLINA GEODETIC SURVEY

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4105 Reedy Creek Road  
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(919)733-3836



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## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/25/2015 Finish: 3/25/2015

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## Metadata Information

### Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

### Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### LAS:

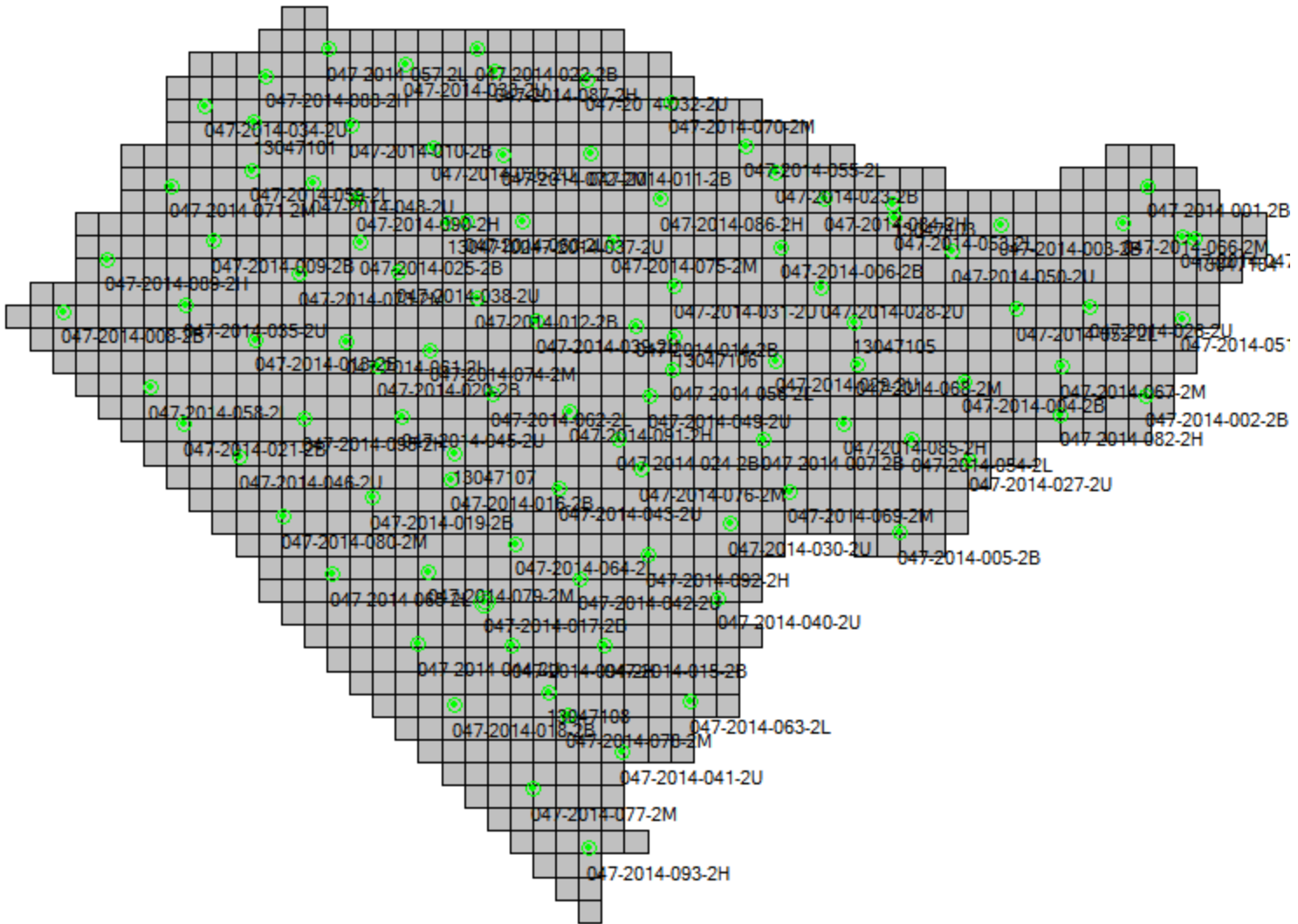
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\ColumbusCoNC\Masspoints

Number of Data Files Matching Attribute: 1105 out of 1105



## Tiled-Data Area







LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	101			
2B	33	0.637	0.594	
2U	25	0.477	0.415	
2L	15		0.486	0.486
2M	15		0.842	0.842
2H	13		0.787	0.787
Total	101			

Units: US Survey Feet

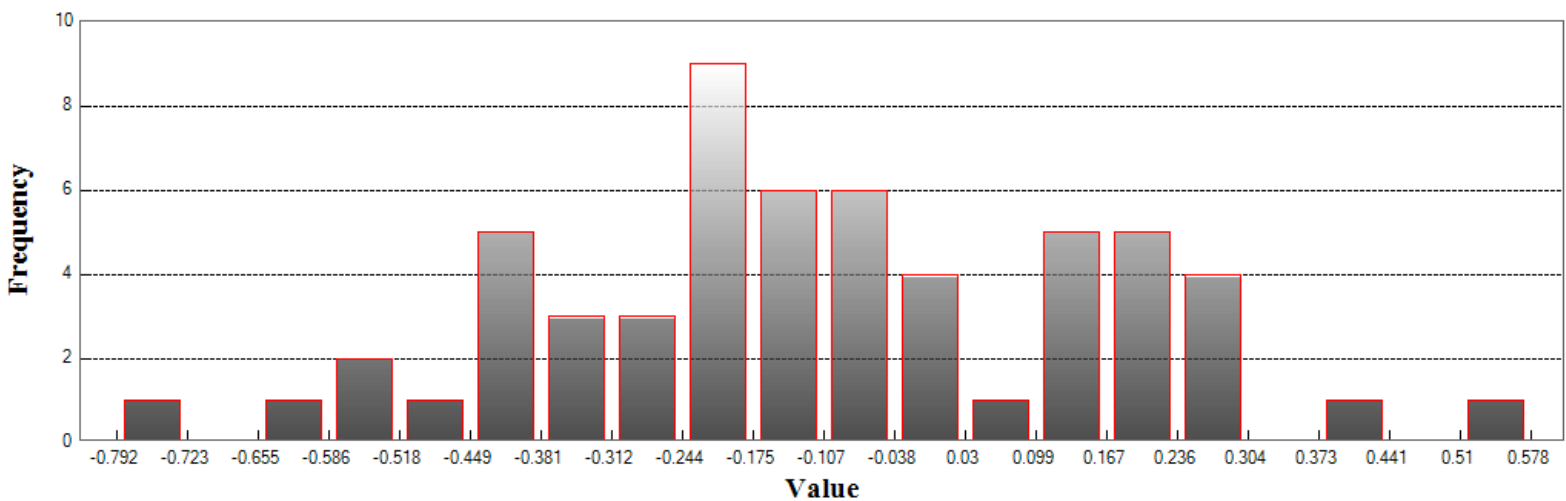


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2B, 2U  
Minimum DZ: -0.791  
Maximum DZ: 0.579  
Mean DZ: -0.108  
Mean Magnitude DZ: 0.488  
Number Observations: 58  
Standard Deviation DZ: 0.274  
RMSE Z: 0.292  
95% Confidence Level Z: 0.573  
Units: US Survey Feet

# Histogram



Min: -0.791  
Max: 0.579  
Number Of Bins: 20  
Bin Interval: 0.069

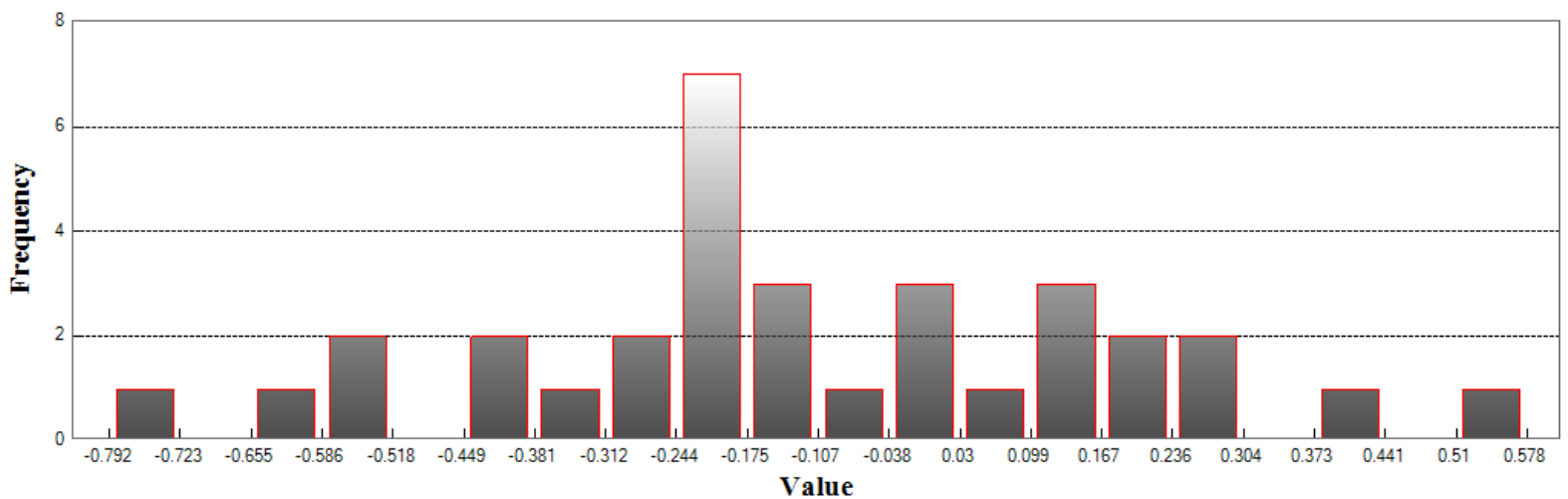


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.791  
Maximum DZ: 0.579  
Mean DZ: -0.116  
Mean Magnitude DZ: 0.513  
Number Observations: 33  
Standard Deviation DZ: 0.308  
RMSE Z: 0.325  
95th Percentile: 0.594  
Units: US Survey Feet

## Histogram



Min: -0.791

Max: 0.579

Number Of Bins: 20

Bin Interval: 0.069

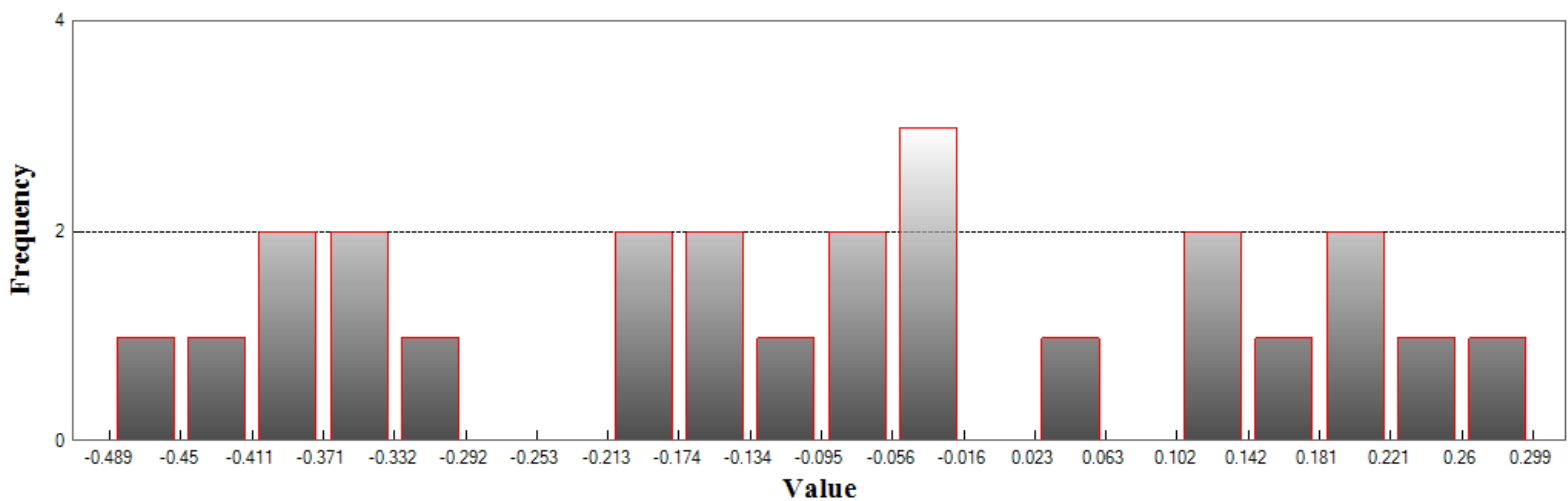


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.49  
Maximum DZ: 0.299  
Mean DZ: -0.096  
Mean Magnitude DZ: 0.454  
Number Observations: 25  
Standard Deviation DZ: 0.228  
RMSE Z: 0.243  
95th Percentile: 0.415  
Units: US Survey Feet

## Histogram



Min: -0.49

Max: 0.299

Number Of Bins: 20

Bin Interval: 0.039

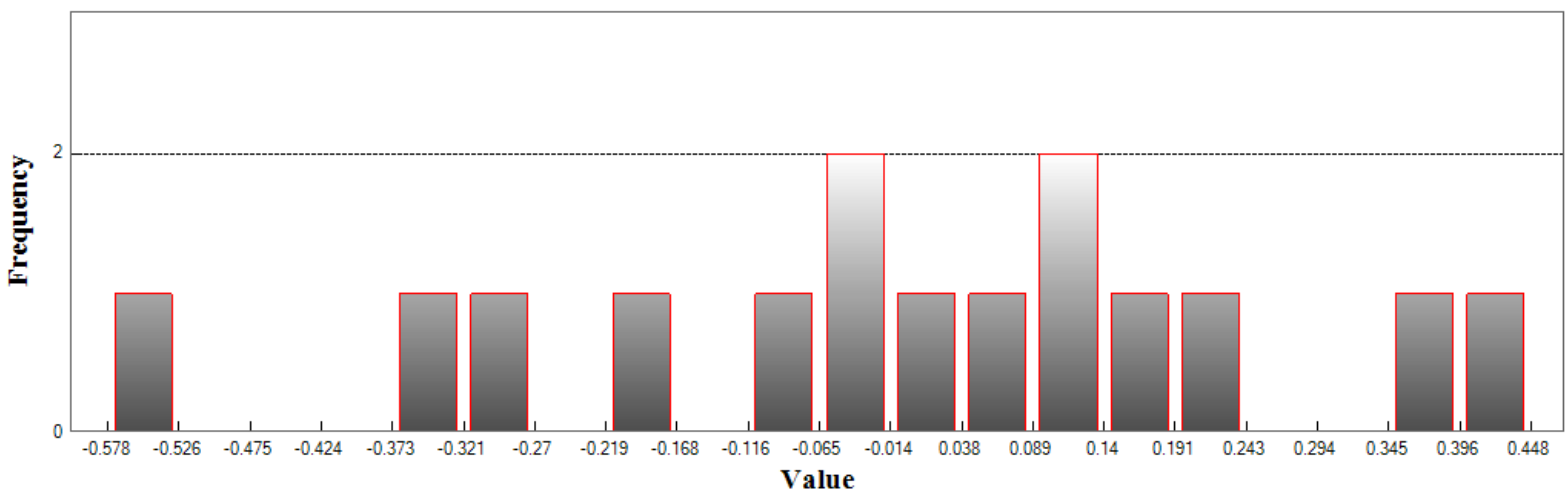


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.578  
Maximum DZ: 0.447  
Mean DZ: -0.001  
Mean Magnitude DZ: 0.458  
Number Observations: 15  
Standard Deviation DZ: 0.276  
RMSE Z: 0.266  
95th Percentile: 0.486  
Units: US Survey Feet

## Histogram



Min: -0.578

Max: 0.447

Number Of Bins: 20

Bin Interval: 0.051

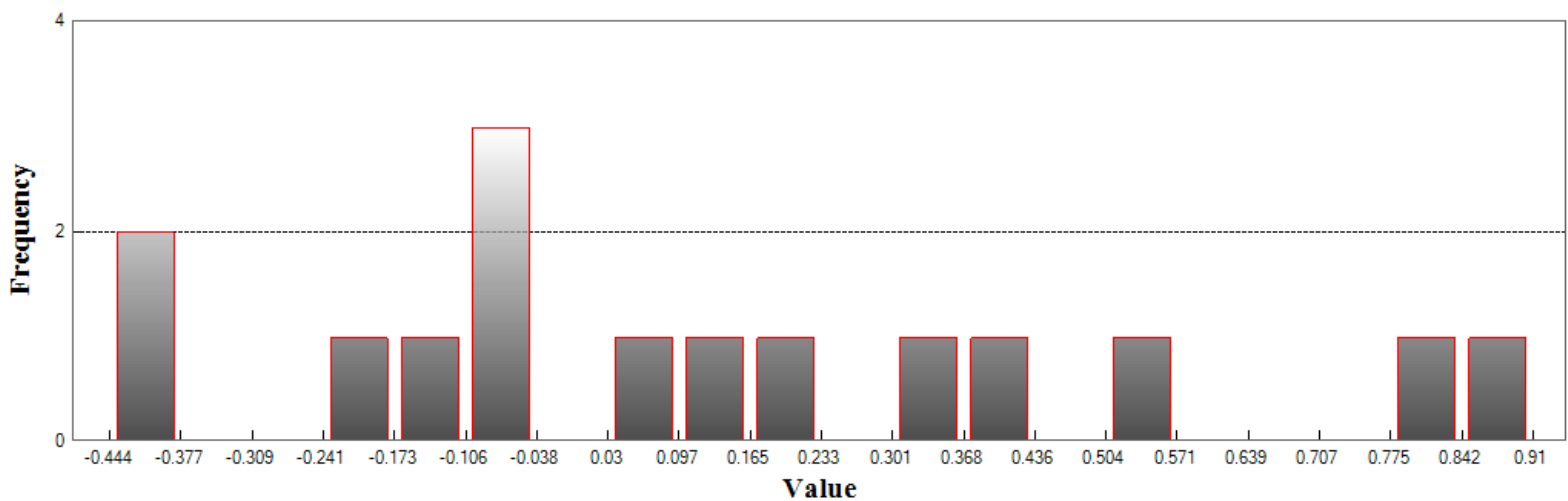


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.444  
Maximum DZ: 0.91  
Mean DZ: 0.128  
Mean Magnitude DZ: 0.57  
Number Observations: 15  
Standard Deviation DZ: 0.408  
RMSE Z: 0.414  
95th Percentile: 0.842  
Units: US Survey Feet

## Histogram



Min: -0.444

Max: 0.91

Number Of Bins: 20

Bin Interval: 0.068

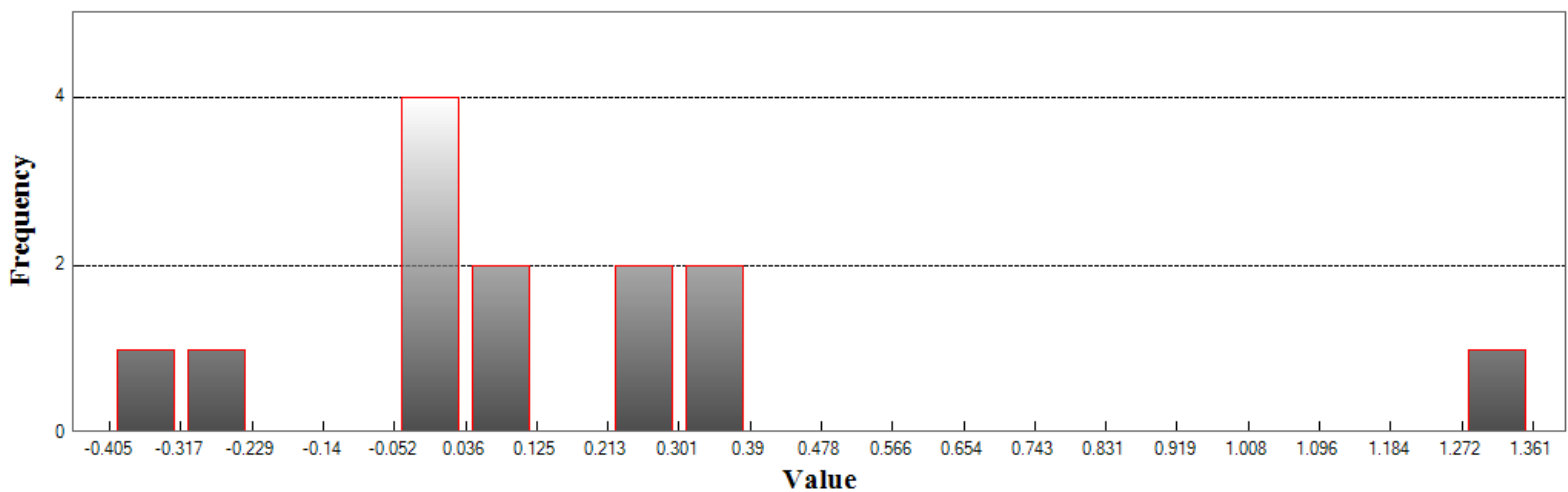


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.405  
Maximum DZ: 1.361  
Mean DZ: 0.152  
Mean Magnitude DZ: 0.521  
Number Observations: 13  
Standard Deviation DZ: 0.431  
RMSE Z: 0.441  
95th Percentile: 0.787  
Units: US Survey Feet

## Histogram



Min: -0.405

Max: 1.361

Number Of Bins: 20

Bin Interval: 0.088



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2M, 2H

Minimum DZ: -0.578

Maximum DZ: 1.361

Mean DZ: 0.09

Mean Magnitude DZ: 0.518

Number Observations: 43

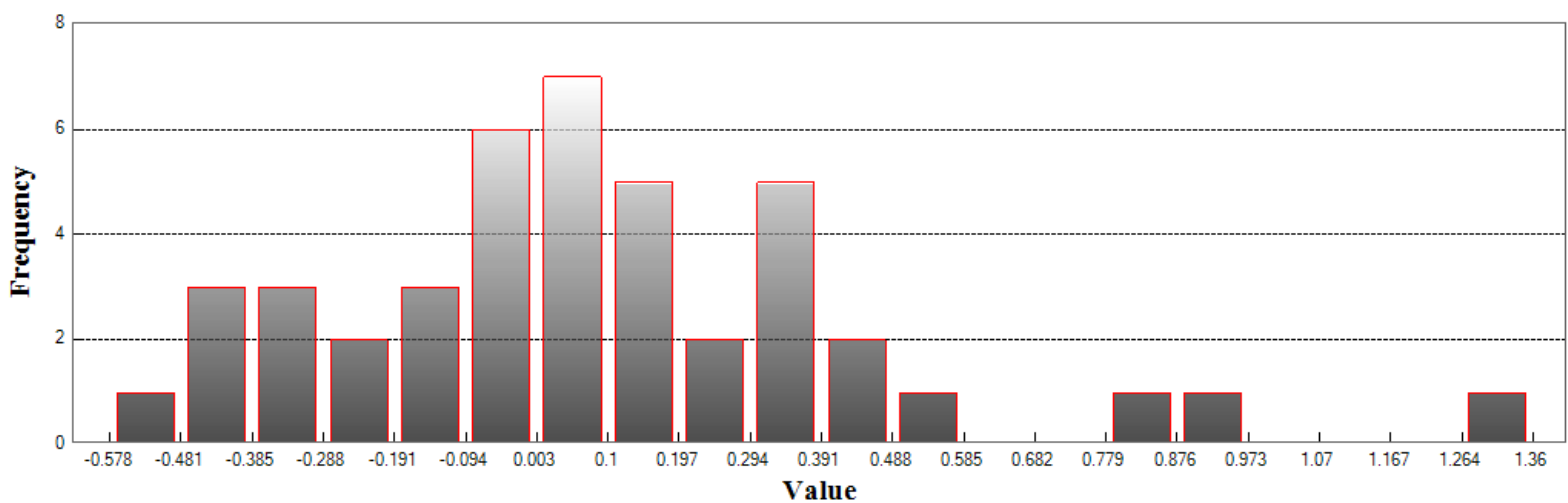
Standard Deviation DZ: 0.372

RMSE Z: 0.379

95th Percentile: 0.789

Units: US Survey Feet

## Histogram



Min: -0.578

Max: 1.361

Number Of Bins: 20

Bin Interval: 0.097



**NORTH CAROLINA GEODETIC SURVEY**

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## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/20/2015 Finish: 3/20/2015

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## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

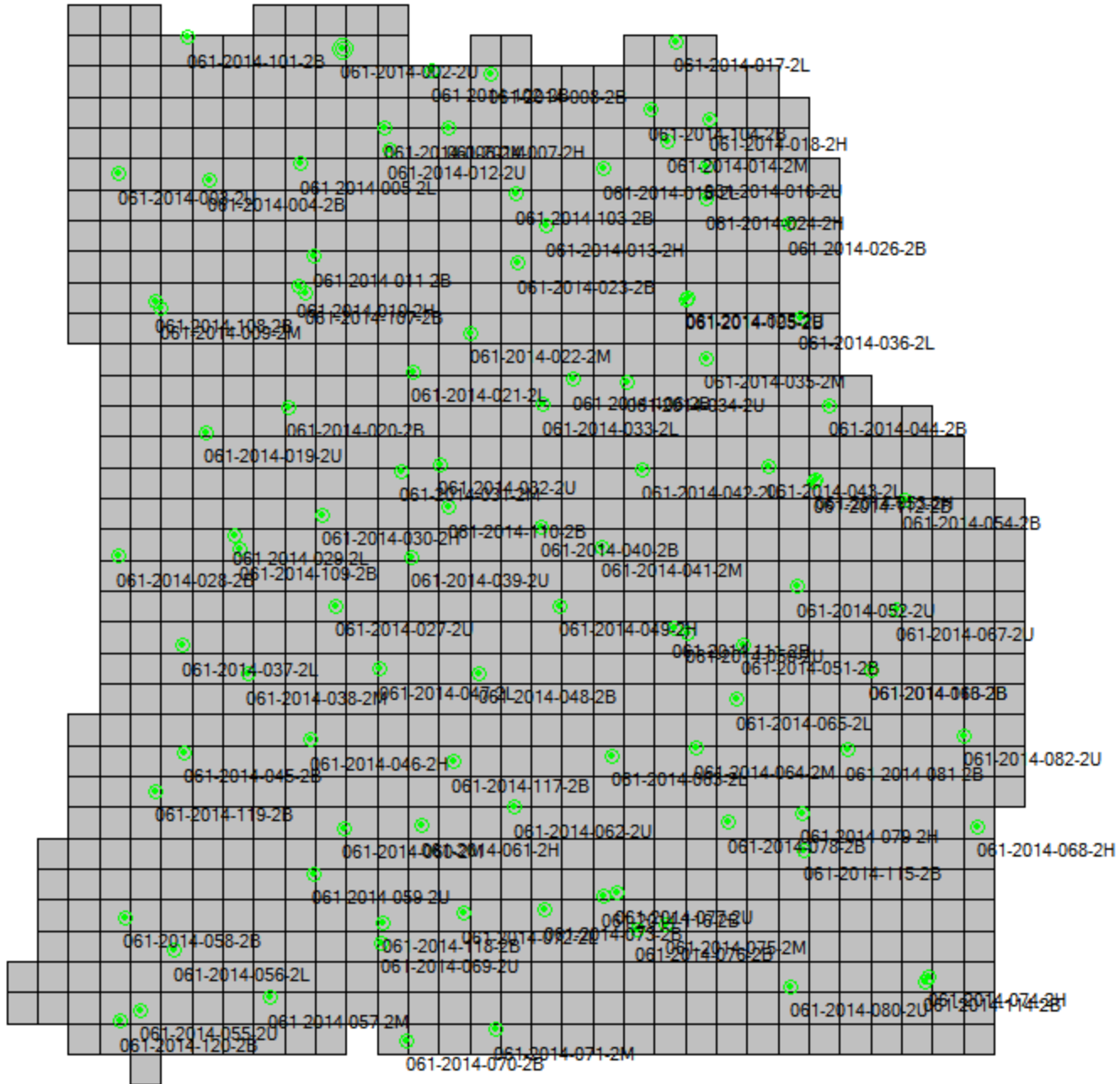
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\DuplinCoNC\Masspoints

Number of Data Files Matching Attribute: Not Specified



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	101			
2U	21	0.466	0.390	
2B	40	0.404	0.434	
2L	14		0.425	0.425
2M	13		0.817	0.817
2H	13		0.567	0.567
Total	101			

Units: US Survey Feet

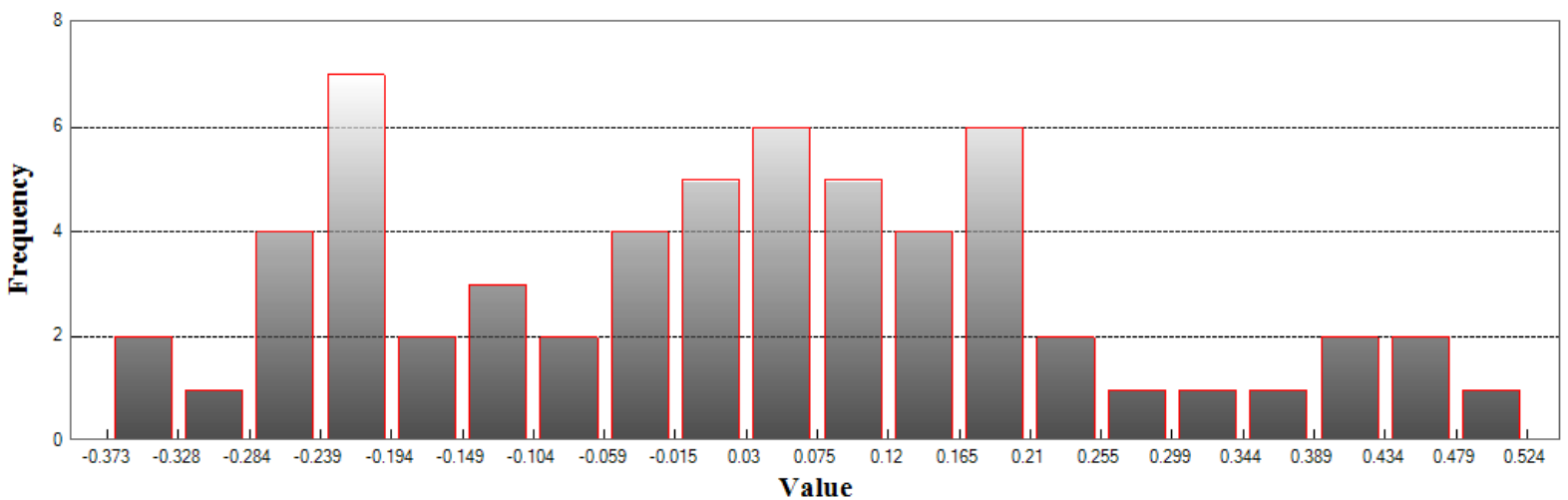


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B  
Minimum DZ: -0.373  
Maximum DZ: 0.524  
Mean DZ: 0.031  
Mean Magnitude DZ: 0.42  
Number Observations: 61  
Standard Deviation DZ: 0.217  
RMSE Z: 0.217  
95% Confidence Level Z: 0.426  
Units: US Survey Feet

# Histogram



Min: -0.373  
Max: 0.524  
Number Of Bins: 20  
Bin Interval: 0.045

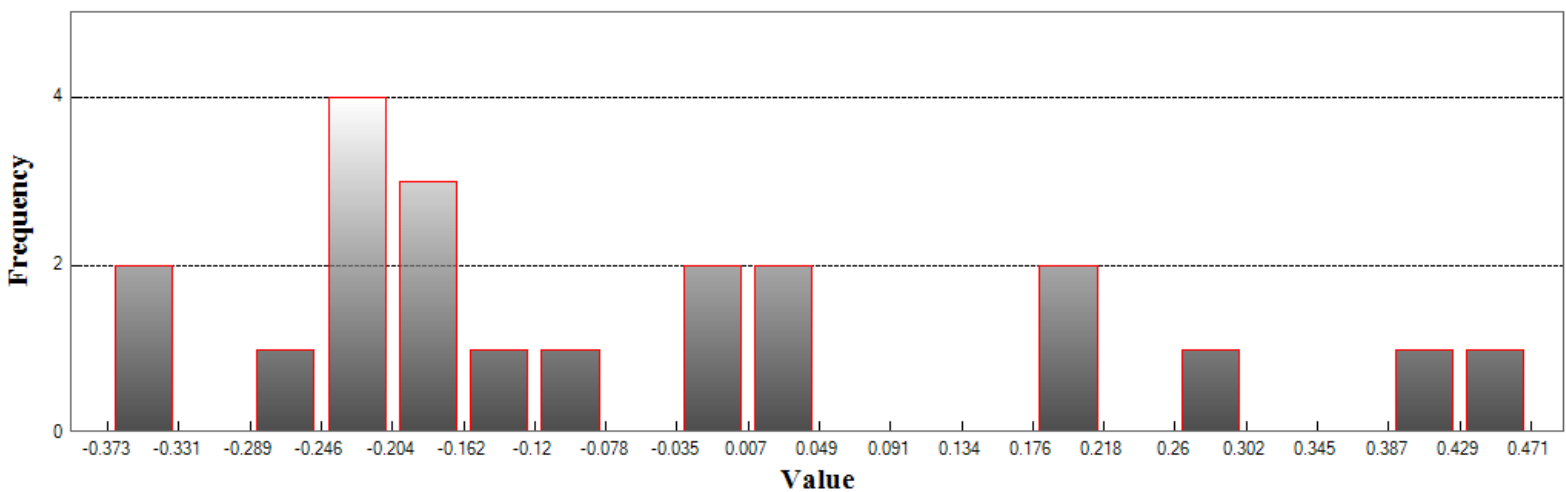


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.373  
Maximum DZ: 0.471  
Mean DZ: -0.055  
Mean Magnitude DZ: 0.45  
Number Observations: 21  
Standard Deviation DZ: 0.237  
RMSE Z: 0.238  
95th Percentile: 0.39  
Units: US Survey Feet

## Histogram



Min: -0.373

Max: 0.471

Number Of Bins: 20

Bin Interval: 0.042

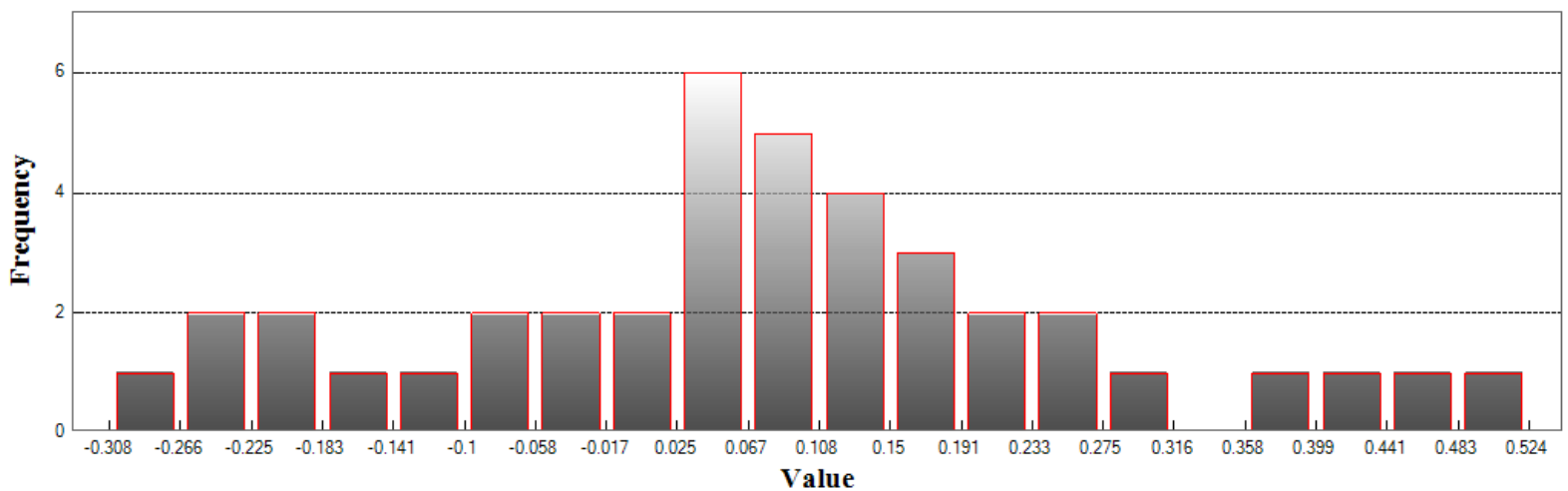


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.308  
Maximum DZ: 0.524  
Mean DZ: 0.076  
Mean Magnitude DZ: 0.404  
Number Observations: 40  
Standard Deviation DZ: 0.194  
RMSE Z: 0.206  
95th Percentile: 0.434  
Units: US Survey Feet

## Histogram



Min: -0.308

Max: 0.524

Number Of Bins: 20

Bin Interval: 0.042

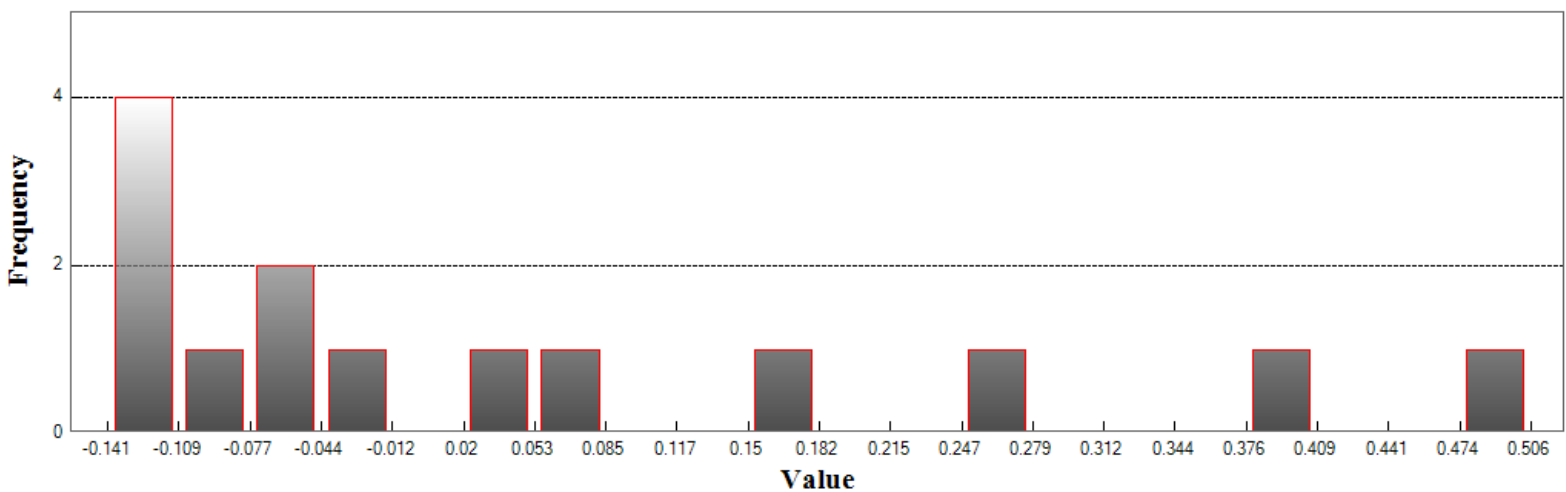


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.141  
Maximum DZ: 0.506  
Mean DZ: 0.046  
Mean Magnitude DZ: 0.395  
Number Observations: 14  
Standard Deviation DZ: 0.207  
RMSE Z: 0.205  
95th Percentile: 0.425  
Units: US Survey Feet

## Histogram



Min: -0.141

Max: 0.506

Number Of Bins: 20

Bin Interval: 0.032

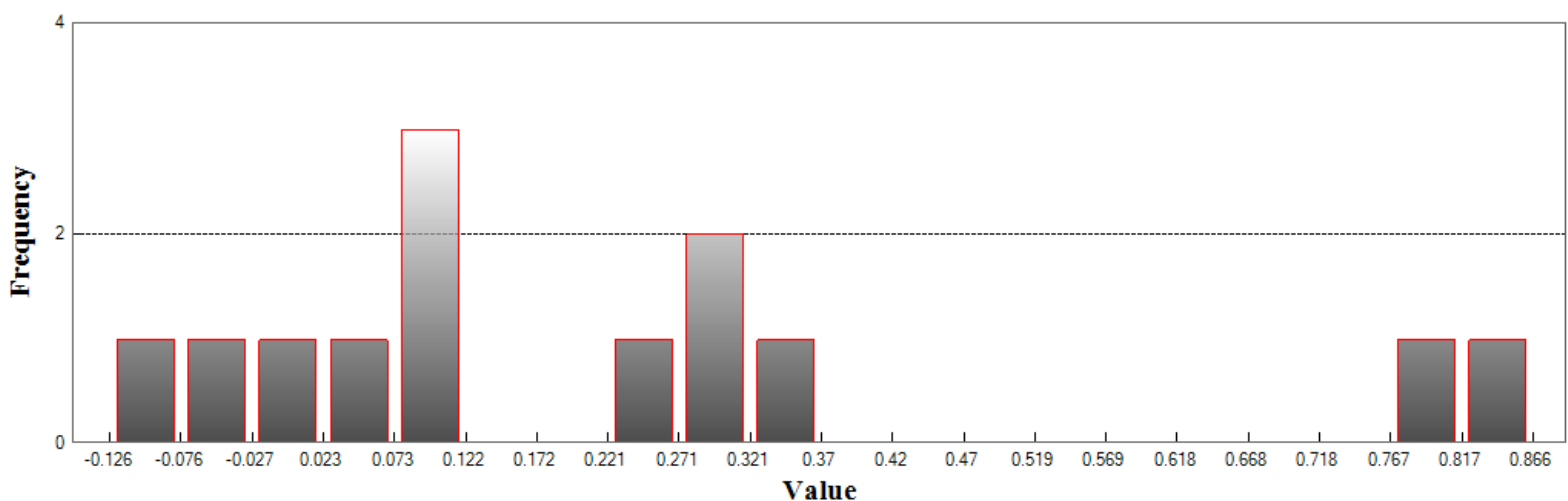


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.126  
Maximum DZ: 0.866  
Mean DZ: 0.229  
Mean Magnitude DZ: 0.51  
Number Observations: 13  
Standard Deviation DZ: 0.3  
RMSE Z: 0.368  
95th Percentile: 0.817  
Units: US Survey Feet

## Histogram



Min: -0.126

Max: 0.866

Number Of Bins: 20

Bin Interval: 0.05



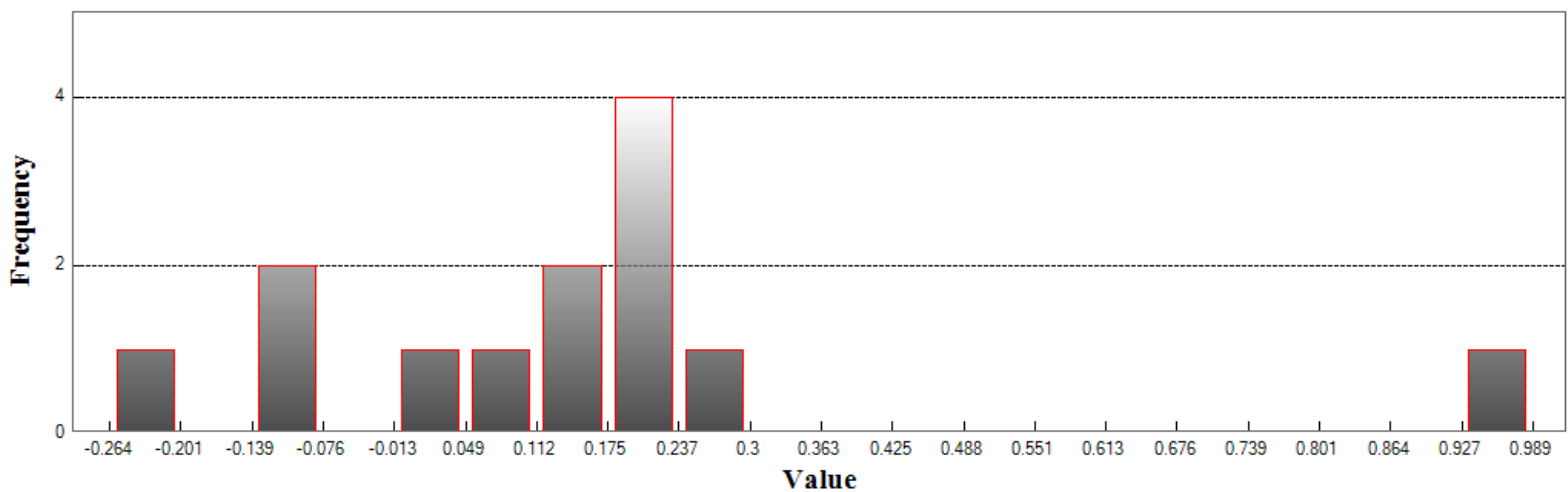


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.264  
Maximum DZ: 0.99  
Mean DZ: 0.152  
Mean Magnitude DZ: 0.475  
Number Observations: 13  
Standard Deviation DZ: 0.296  
RMSE Z: 0.322  
95th Percentile: 0.567  
Units: US Survey Feet

## Histogram



Min: -0.264

Max: 0.99

Number Of Bins: 20

Bin Interval: 0.063



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2M, 2H

Minimum DZ: -0.264

Maximum DZ: 0.99

Mean DZ: 0.14

Mean Magnitude DZ: 0.461

Number Observations: 40

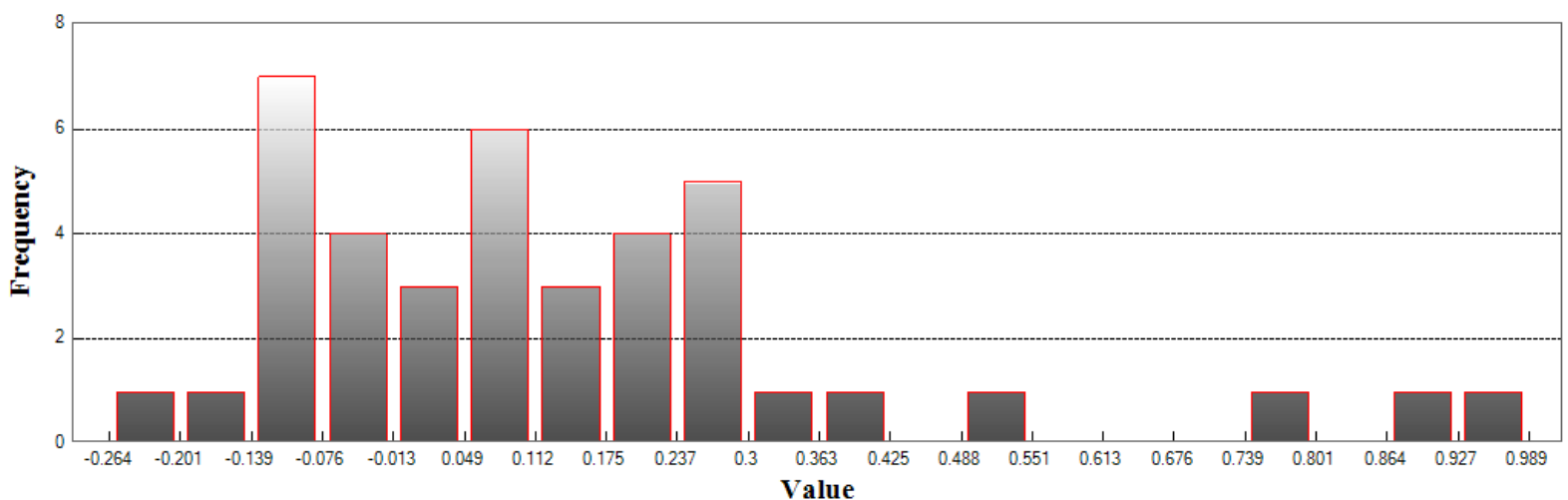
Standard Deviation DZ: 0.273

RMSE Z: 0.304

95th Percentile: 0.788

Units: US Survey Feet

## Histogram



Min: -0.264

Max: 0.99

Number Of Bins: 20

Bin Interval: 0.063

**NORTH CAROLINA GEODETIC SURVEY**

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## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/23/2015 Finish: 3/23/2015

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## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

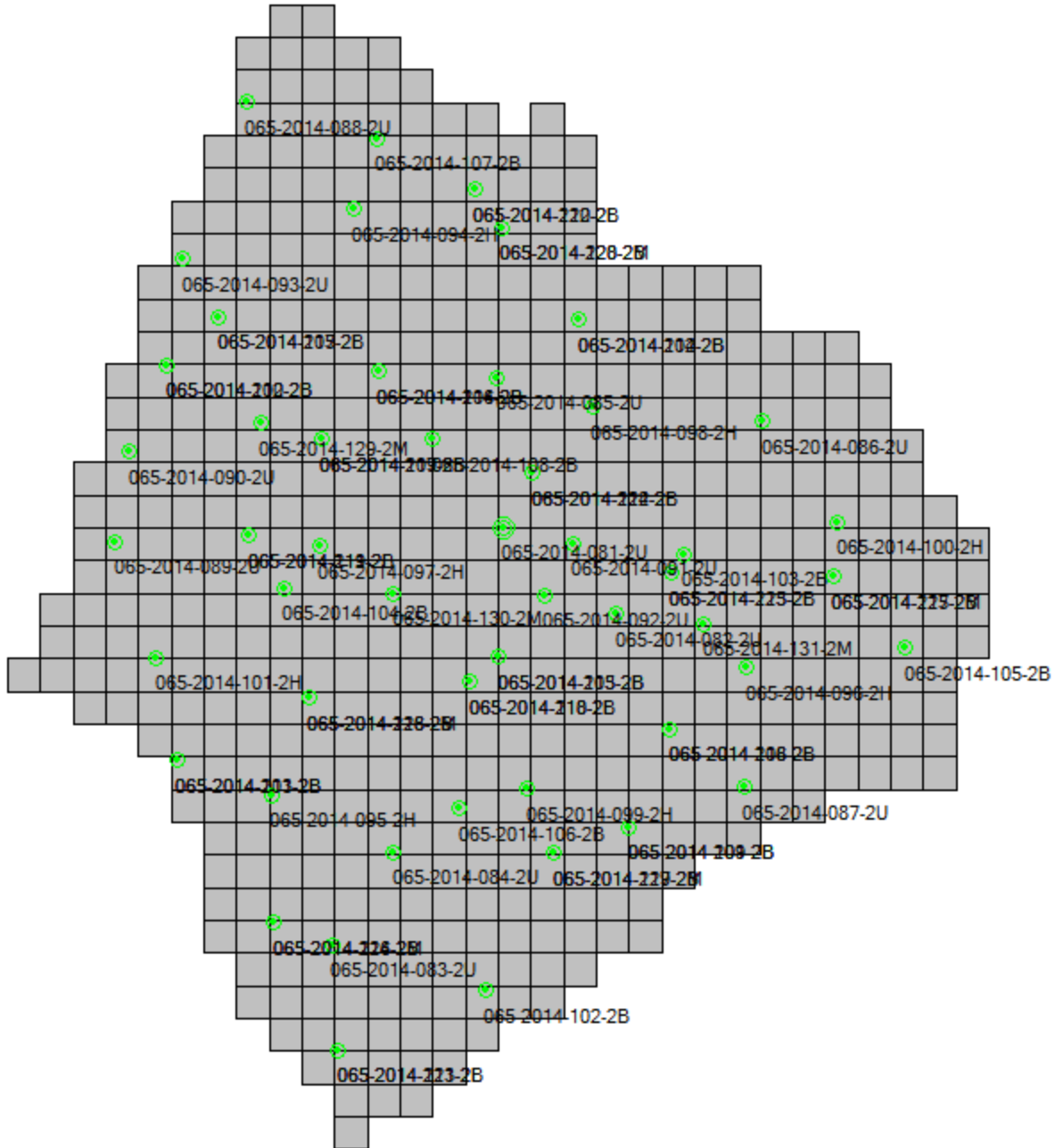
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\EdgecombeCoNC\Masspoints

Number of Data Files Matching Attribute: Not Specified



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	71			
2U	13	0.432	0.399	
2H	8		0.738	0.738
2B	33	0.569	0.700	
2L	9		0.454	0.454
2M	8		0.761	0.761
Total	71			

Units: US Survey Feet

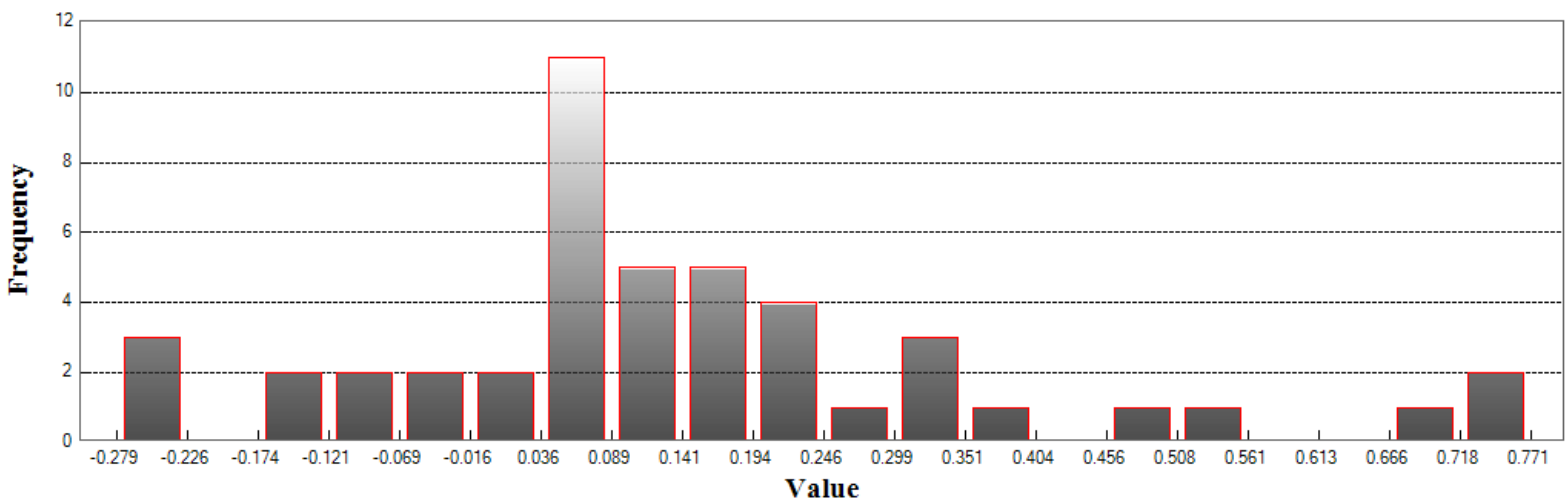


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B  
Minimum DZ: -0.278  
Maximum DZ: 0.771  
Mean DZ: 0.141  
Mean Magnitude DZ: 0.45  
Number Observations: 46  
Standard Deviation DZ: 0.236  
RMSE Z: 0.272  
95% Confidence Level Z: 0.534  
Units: US Survey Feet

# Histogram



Min: -0.278  
Max: 0.771  
Number Of Bins: 20  
Bin Interval: 0.052

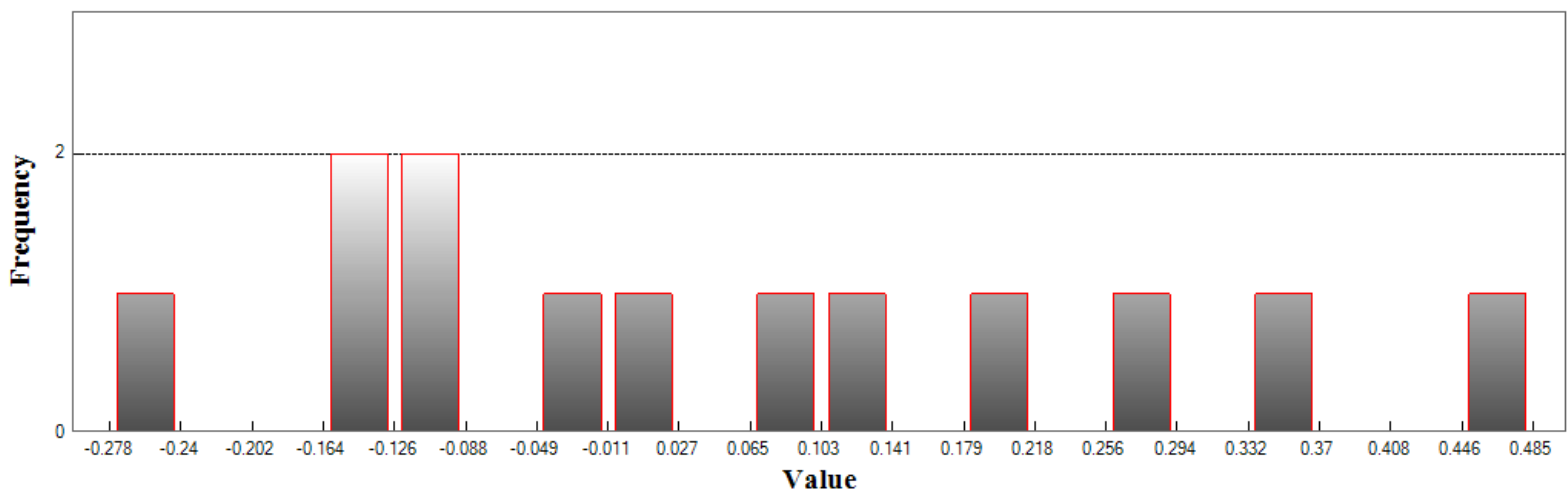


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.278  
Maximum DZ: 0.485  
Mean DZ: 0.054  
Mean Magnitude DZ: 0.422  
Number Observations: 13  
Standard Deviation DZ: 0.222  
RMSE Z: 0.22  
95th Percentile: 0.399  
Units: US Survey Feet

## Histogram



Min: -0.278  
Max: 0.485  
Number Of Bins: 20  
Bin Interval: 0.038

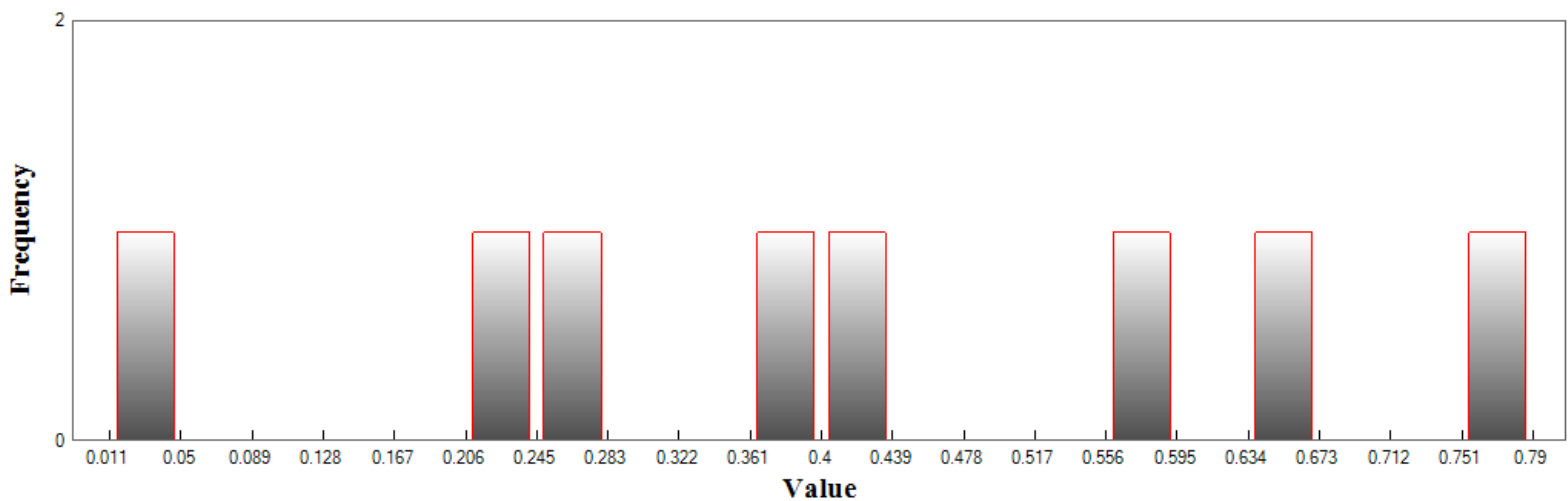


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: 0.011  
Maximum DZ: 0.79  
Mean DZ: 0.415  
Mean Magnitude DZ: 0.644  
Number Observations: 8  
Standard Deviation DZ: 0.248  
RMSE Z: 0.475  
95th Percentile: 0.738  
Units: US Survey Feet

## Histogram



Min: 0.011

Max: 0.79

Number Of Bins: 20

Bin Interval: 0.039



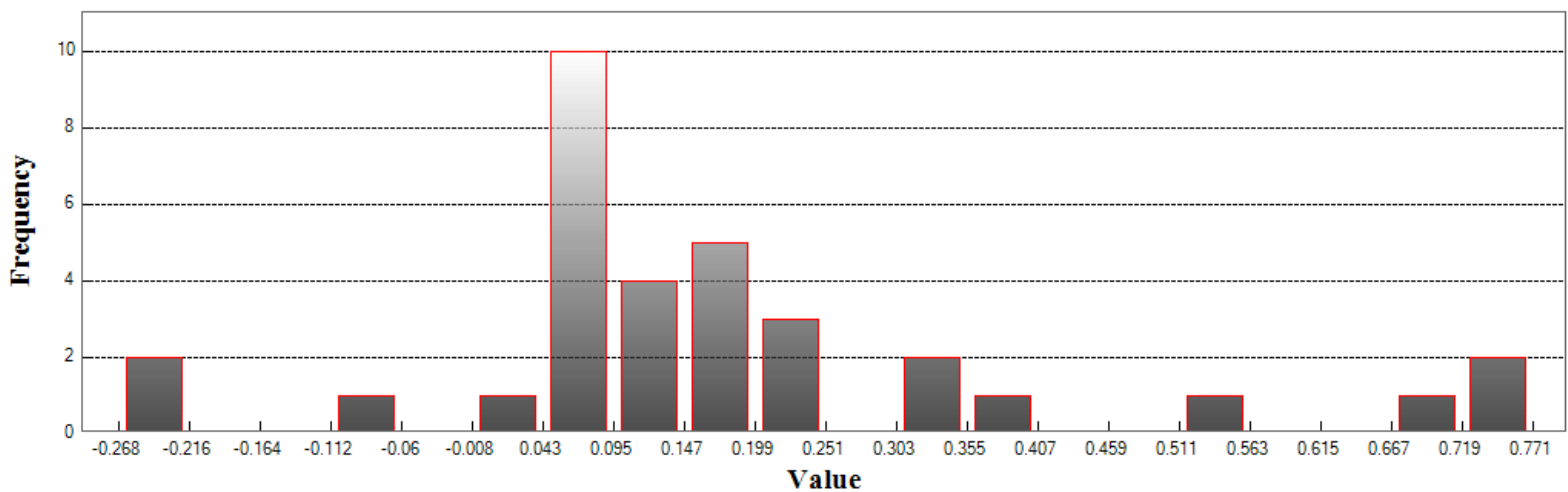


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.268  
Maximum DZ: 0.771  
Mean DZ: 0.175  
Mean Magnitude DZ: 0.46  
Number Observations: 33  
Standard Deviation DZ: 0.235  
RMSE Z: 0.29  
95th Percentile: 0.7  
Units: US Survey Feet

## Histogram



Min: -0.268

Max: 0.771

Number Of Bins: 20

Bin Interval: 0.052

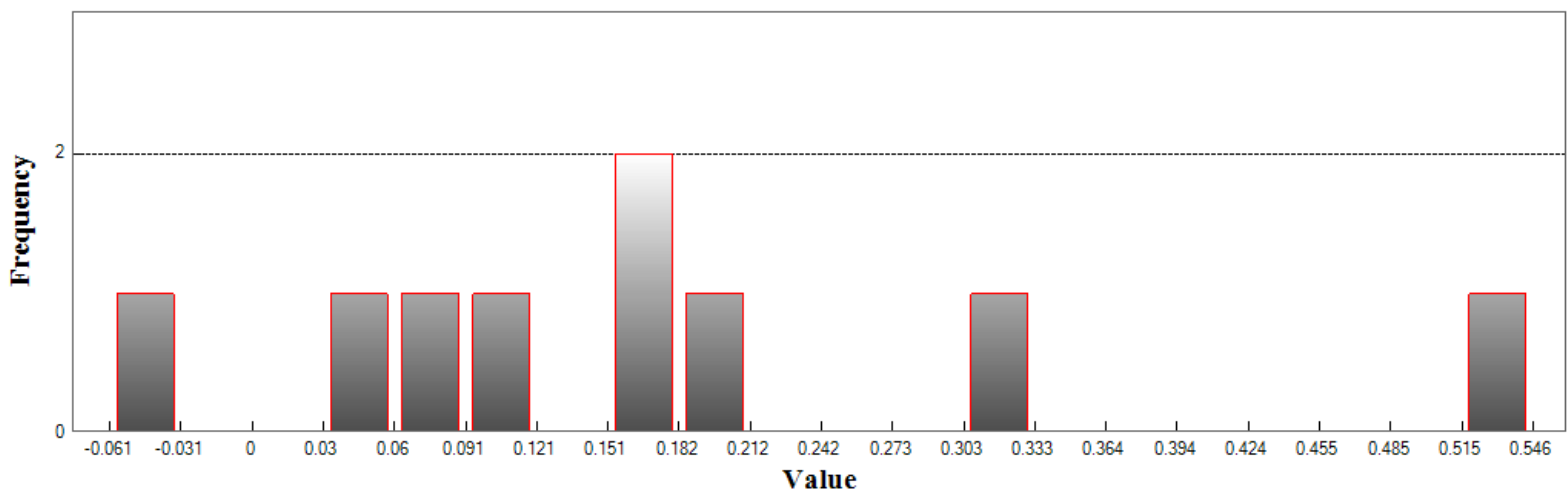


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.061  
Maximum DZ: 0.546  
Mean DZ: 0.174  
Mean Magnitude DZ: 0.433  
Number Observations: 9  
Standard Deviation DZ: 0.175  
RMSE Z: 0.24  
95th Percentile: 0.454  
Units: US Survey Feet

## Histogram



Min: -0.061

Max: 0.546

Number Of Bins: 20

Bin Interval: 0.03

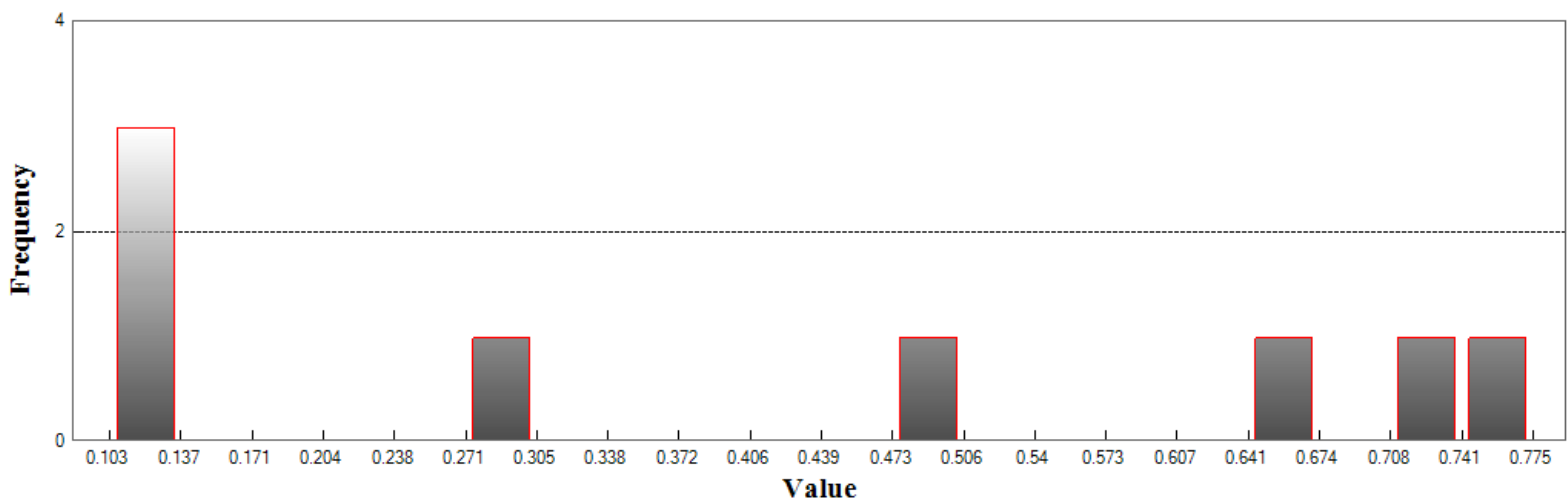


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: 0.103  
Maximum DZ: 0.775  
Mean DZ: 0.412  
Mean Magnitude DZ: 0.642  
Number Observations: 8  
Standard Deviation DZ: 0.292  
RMSE Z: 0.495  
95th Percentile: 0.761  
Units: US Survey Feet

## Histogram



Min: 0.103  
Max: 0.775  
Number Of Bins: 20  
Bin Interval: 0.034



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2H, 2L, 2M

Minimum DZ: -0.061

Maximum DZ: 0.79

Mean DZ: 0.327

Mean Magnitude DZ: 0.576

Number Observations: 25

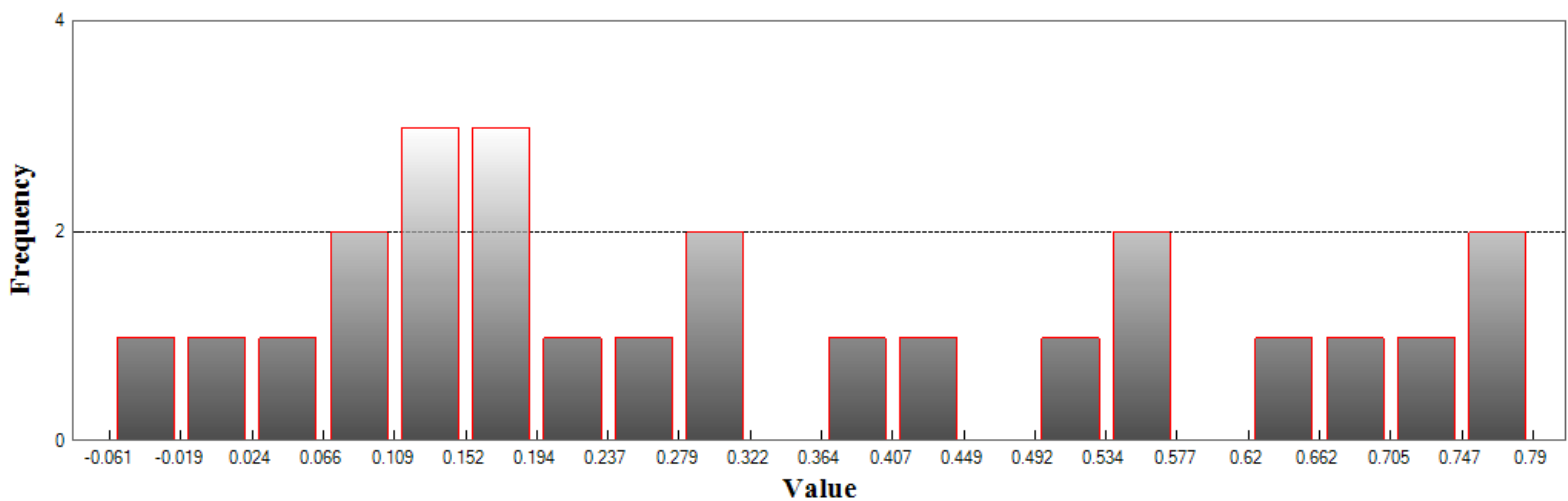
Standard Deviation DZ: 0.259

RMSE Z: 0.414

95th Percentile: 0.767

Units: US Survey Feet

## Histogram



Min: -0.061

Max: 0.79

Number Of Bins: 20

Bin Interval: 0.043

**NORTH CAROLINA GEODETIC SURVEY**

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## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/24/2015 Finish: 3/24/2015

---

## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute:

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute:

LAS:

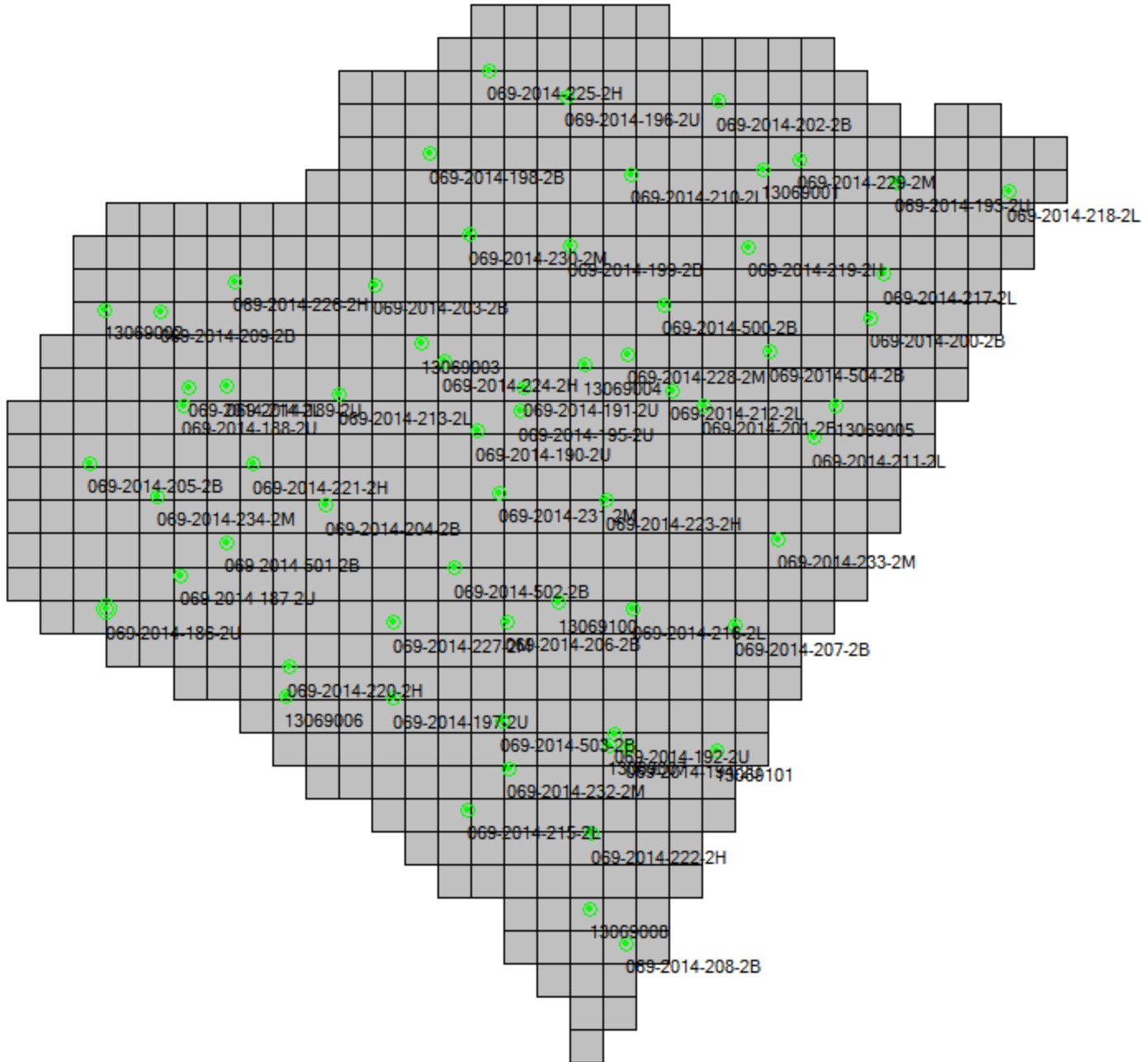
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\FranklinCoNC\Masspoints

Number of Data Files Matching Attribute:



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	64			
2U	12	0.217	0.154	
2B	27	0.276	0.241	
2L	9		0.431	0.431
2H	8		0.640	0.640
2M	8		0.318	0.318
Total	64			

Units: US Survey Feet



# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B

Minimum DZ: -0.254

Maximum DZ: 0.248

Mean DZ: 0.029

Mean Magnitude DZ: 0.338

Number Observations: 39

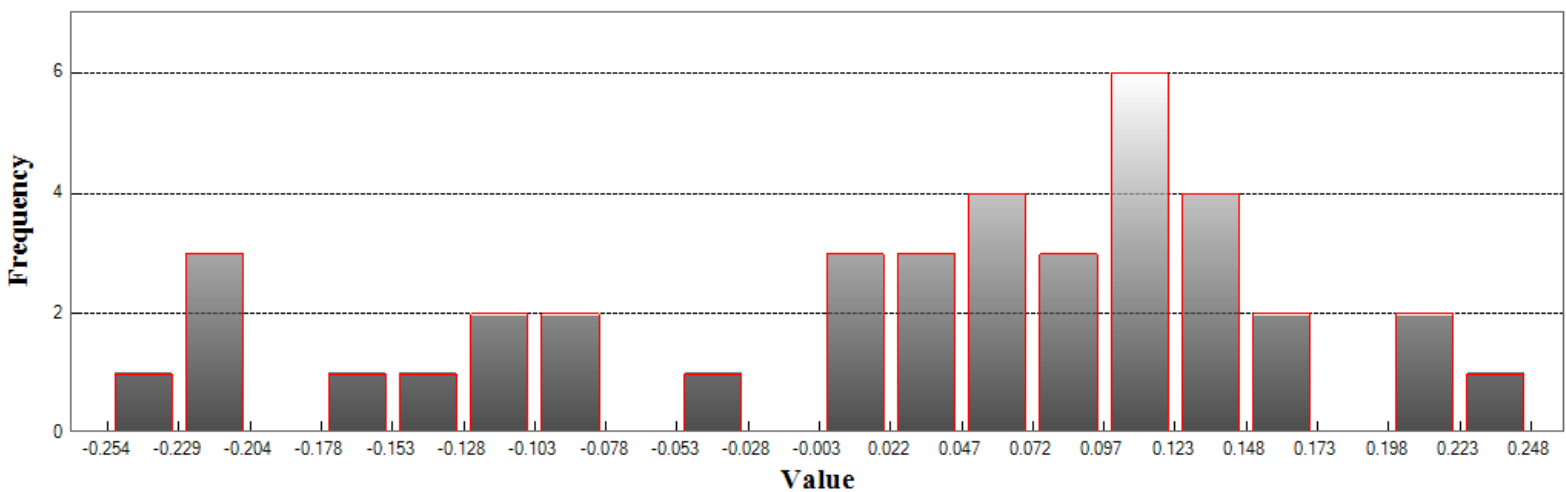
Standard Deviation DZ: 0.131

RMSE Z: 0.132

95% Confidence Level Z: 0.259

Units: US Survey Feet

# Histogram



Min: -0.254

Max: 0.248

Number Of Bins: 20

Bin Interval: 0.025



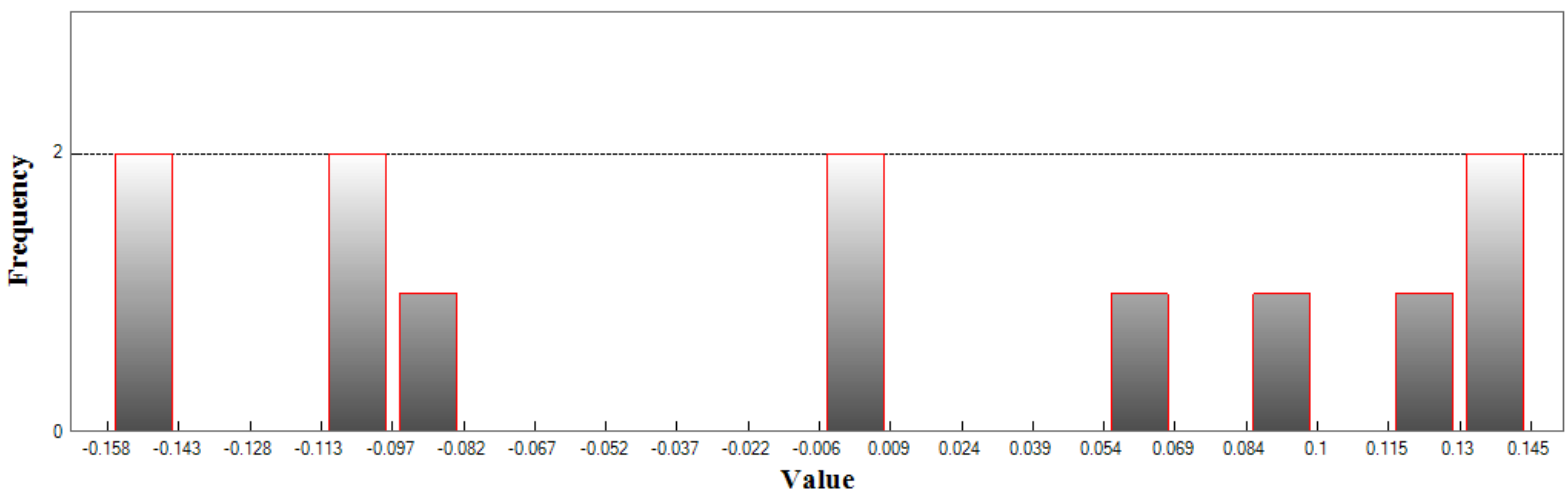


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.158  
Maximum DZ: 0.145  
Mean DZ: -0.004  
Mean Magnitude DZ: 0.314  
Number Observations: 12  
Standard Deviation DZ: 0.115  
RMSE Z: 0.11  
95th Percentile: 0.154  
Units: US Survey Feet

## Histogram



Min: -0.158

Max: 0.145

Number Of Bins: 20

Bin Interval: 0.015

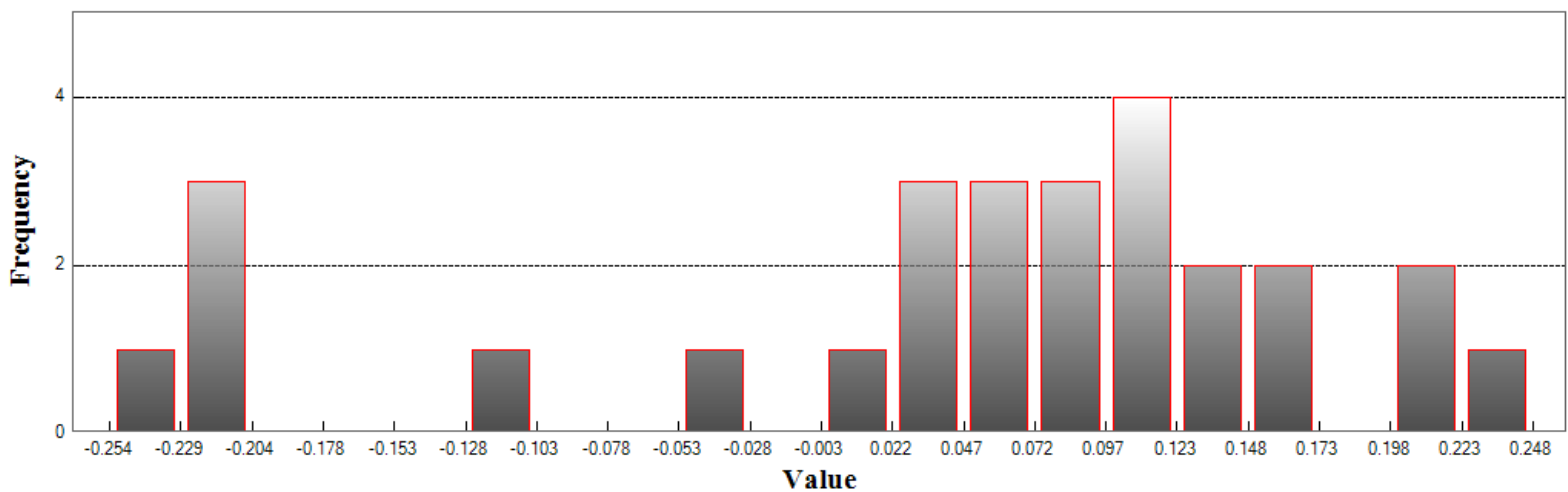


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.254  
Maximum DZ: 0.248  
Mean DZ: 0.044  
Mean Magnitude DZ: 0.348  
Number Observations: 27  
Standard Deviation DZ: 0.136  
RMSE Z: 0.141  
95th Percentile: 0.241  
Units: US Survey Feet

## Histogram



Min: -0.254

Max: 0.248

Number Of Bins: 20

Bin Interval: 0.025

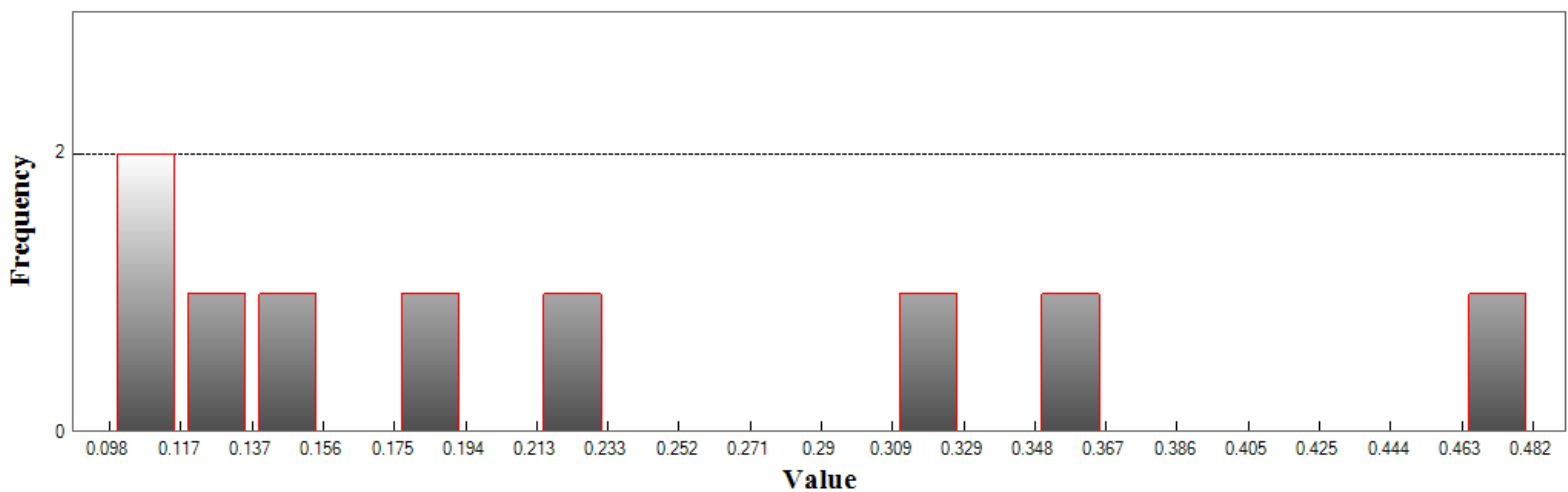


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: 0.098  
Maximum DZ: 0.482  
Mean DZ: 0.225  
Mean Magnitude DZ: 0.475  
Number Observations: 9  
Standard Deviation DZ: 0.131  
RMSE Z: 0.257  
95th Percentile: 0.431  
Units: US Survey Feet

## Histogram



Min: 0.098

Max: 0.482

Number Of Bins: 20

Bin Interval: 0.019

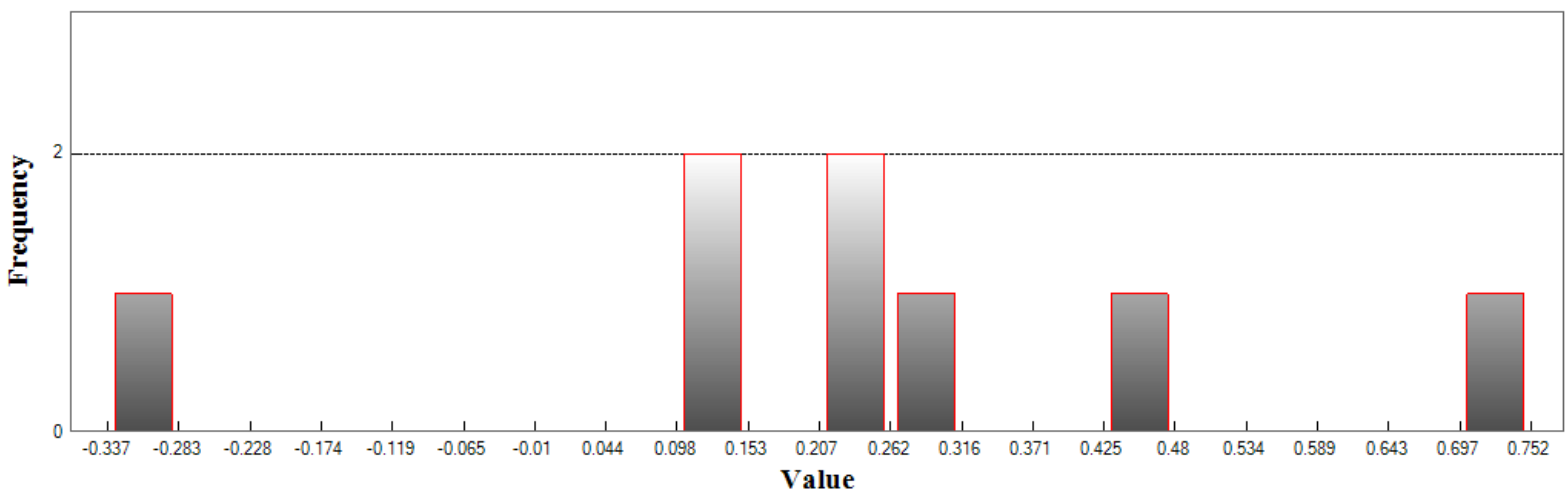


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.337  
Maximum DZ: 0.752  
Mean DZ: 0.233  
Mean Magnitude DZ: 0.563  
Number Observations: 8  
Standard Deviation DZ: 0.306  
RMSE Z: 0.369  
95th Percentile: 0.64  
Units: US Survey Feet

## Histogram



Min: -0.337

Max: 0.752

Number Of Bins: 20

Bin Interval: 0.054

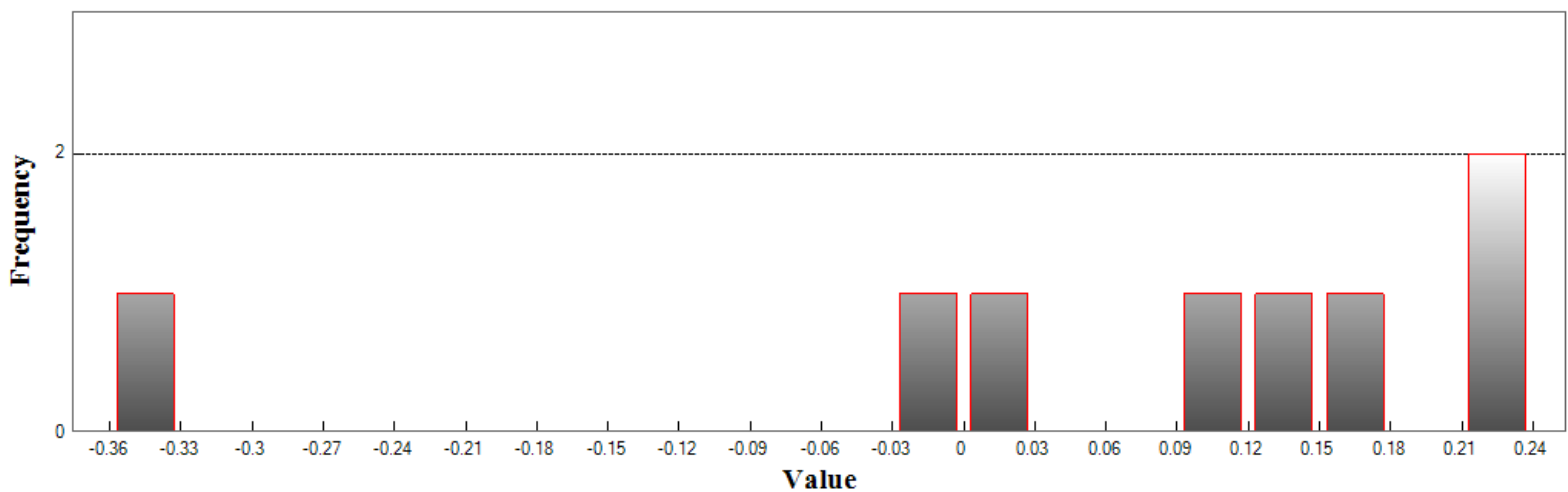


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.36  
Maximum DZ: 0.24  
Mean DZ: 0.064  
Mean Magnitude DZ: 0.399  
Number Observations: 8  
Standard Deviation DZ: 0.196  
RMSE Z: 0.194  
95th Percentile: 0.318  
Units: US Survey Feet

## Histogram



Min: -0.36

Max: 0.24

Number Of Bins: 20

Bin Interval: 0.03



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2H, 2M

Minimum DZ: -0.36

Maximum DZ: 0.752

Mean DZ: 0.176

Mean Magnitude DZ: 0.483

Number Observations: 25

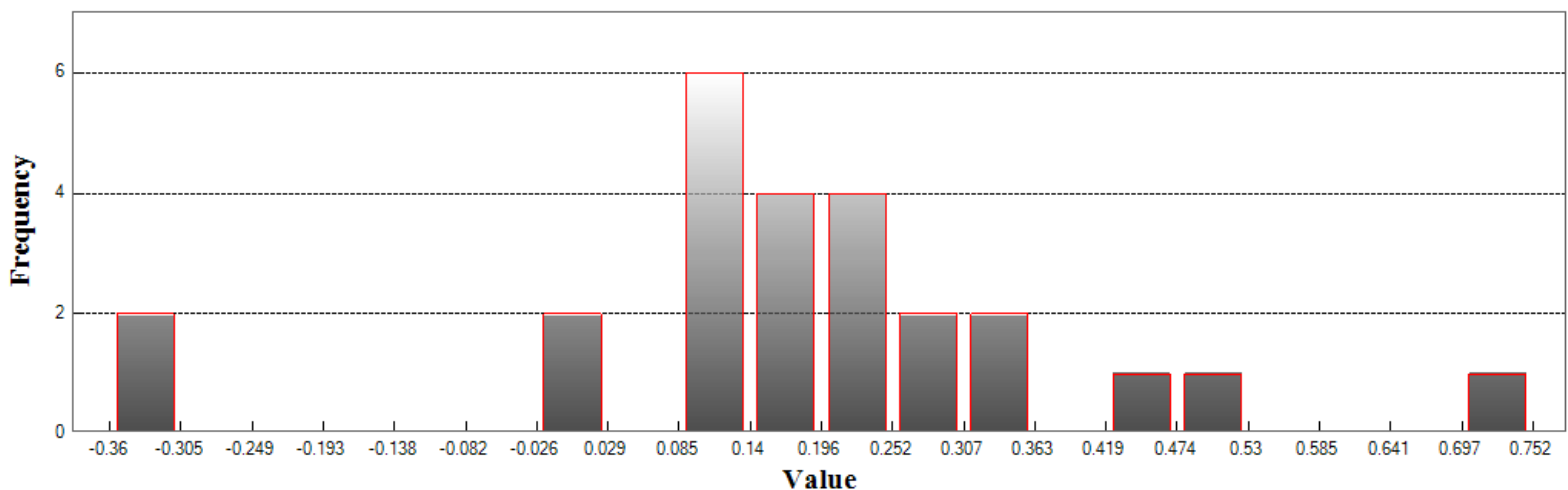
Standard Deviation DZ: 0.224

RMSE Z: 0.282

95th Percentile: 0.472

Units: US Survey Feet

## Histogram



Min: -0.36

Max: 0.752

Number Of Bins: 20

Bin Interval: 0.056

**NORTH CAROLINA GEODETIC SURVEY**

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



---

## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/24/2015 Finish: 3/24/2015

---

## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute:

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute:

LAS:

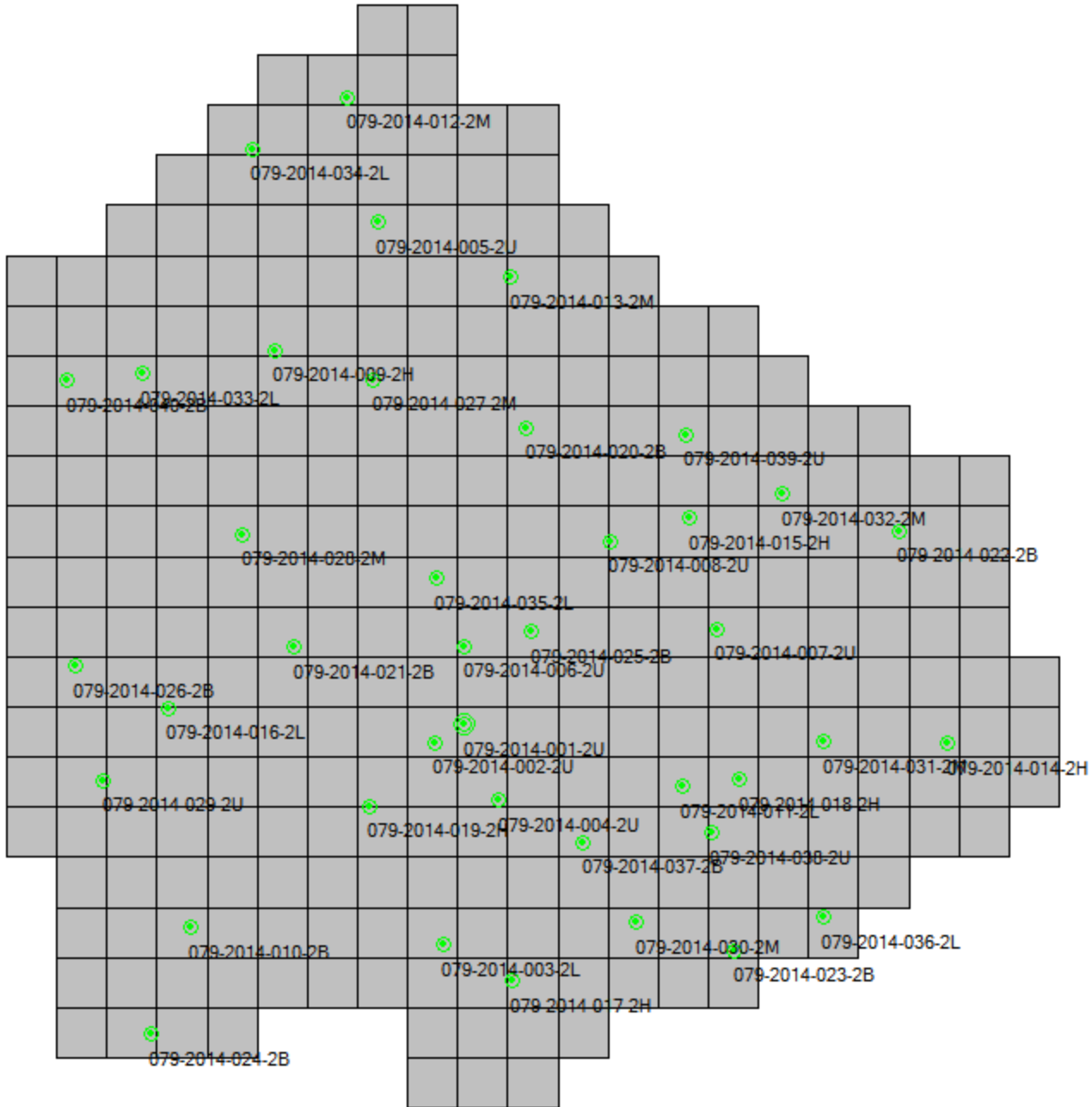
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\GreeneCoNC\Masspoints

Number of Data Files Matching Attribute:



## Tiled-Data Area







LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	40			
2U	10	0.272	0.271	
2L	7		0.381	0.381
2H	6		0.661	0.661
2B	10	0.529	0.525	
2M	7		0.605	0.605
Total	40			

Units: US Survey Feet



# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B

Minimum DZ: -0.115

Maximum DZ: 0.631

Mean DZ: 0.132

Mean Magnitude DZ: 0.391

Number Observations: 20

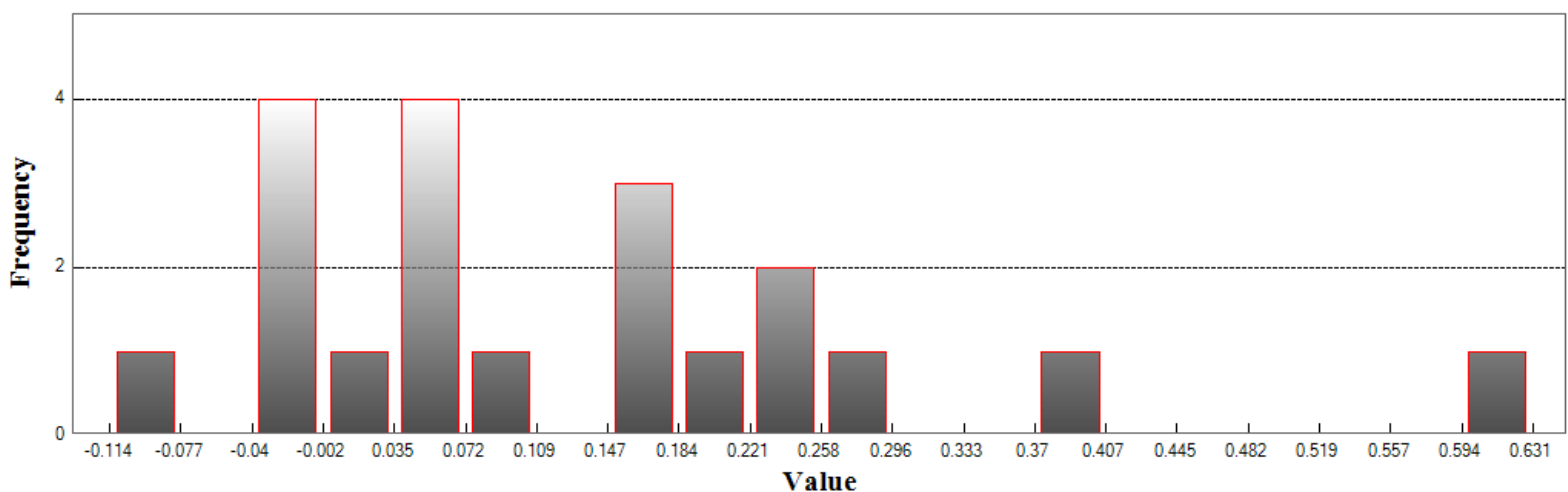
Standard Deviation DZ: 0.174

RMSE Z: 0.215

95% Confidence Level Z: 0.421

Units: US Survey Feet

# Histogram



Min: -0.115

Max: 0.631

Number Of Bins: 20

Bin Interval: 0.037

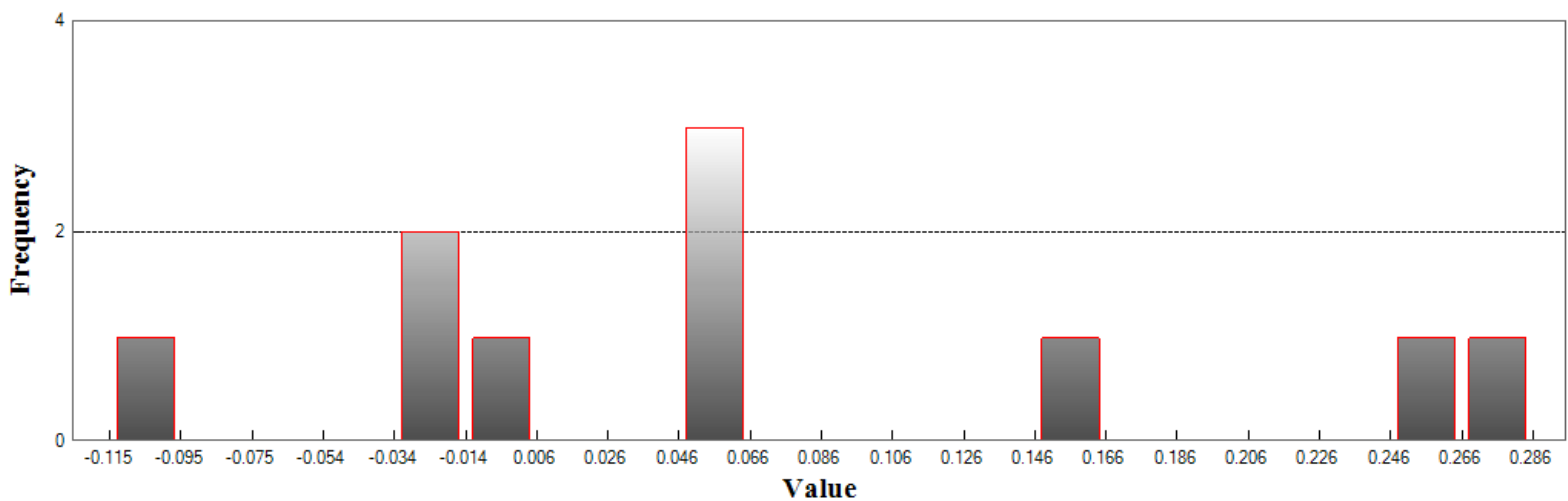


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.115  
Maximum DZ: 0.287  
Mean DZ: 0.069  
Mean Magnitude DZ: 0.321  
Number Observations: 10  
Standard Deviation DZ: 0.127  
RMSE Z: 0.139  
95th Percentile: 0.271  
Units: US Survey Feet

## Histogram



Min: -0.115

Max: 0.287

Number Of Bins: 20

Bin Interval: 0.02

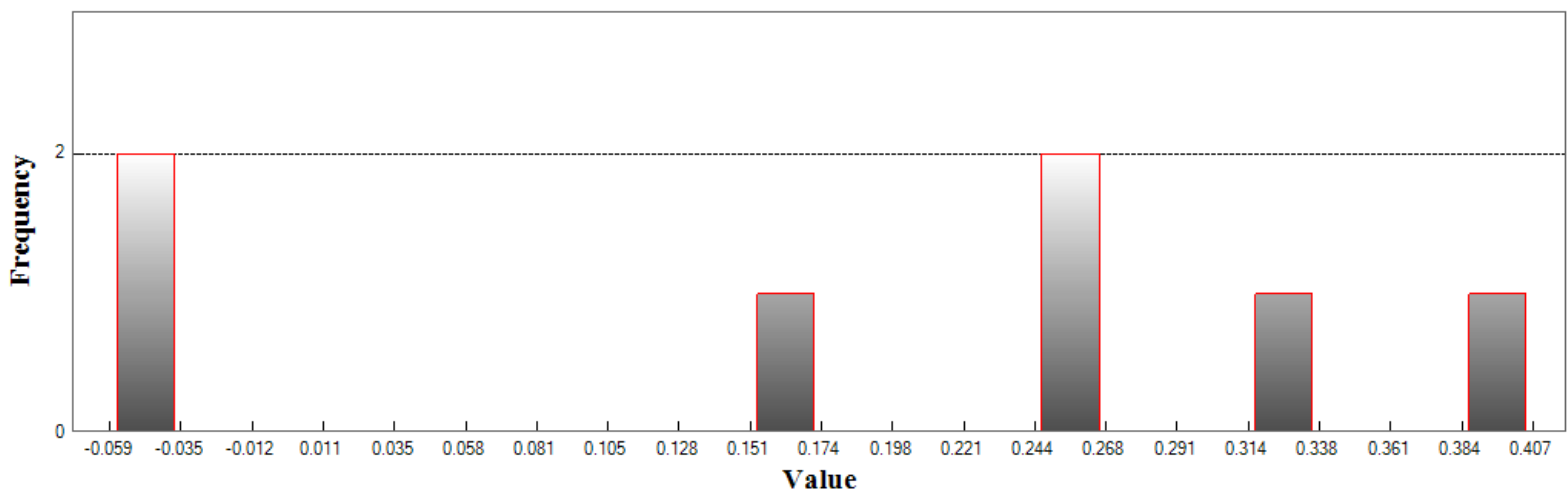


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.059  
Maximum DZ: 0.407  
Mean DZ: 0.187  
Mean Magnitude DZ: 0.465  
Number Observations: 7  
Standard Deviation DZ: 0.178  
RMSE Z: 0.249  
95th Percentile: 0.381  
Units: US Survey Feet

## Histogram



Min: -0.059

Max: 0.407

Number Of Bins: 20

Bin Interval: 0.023

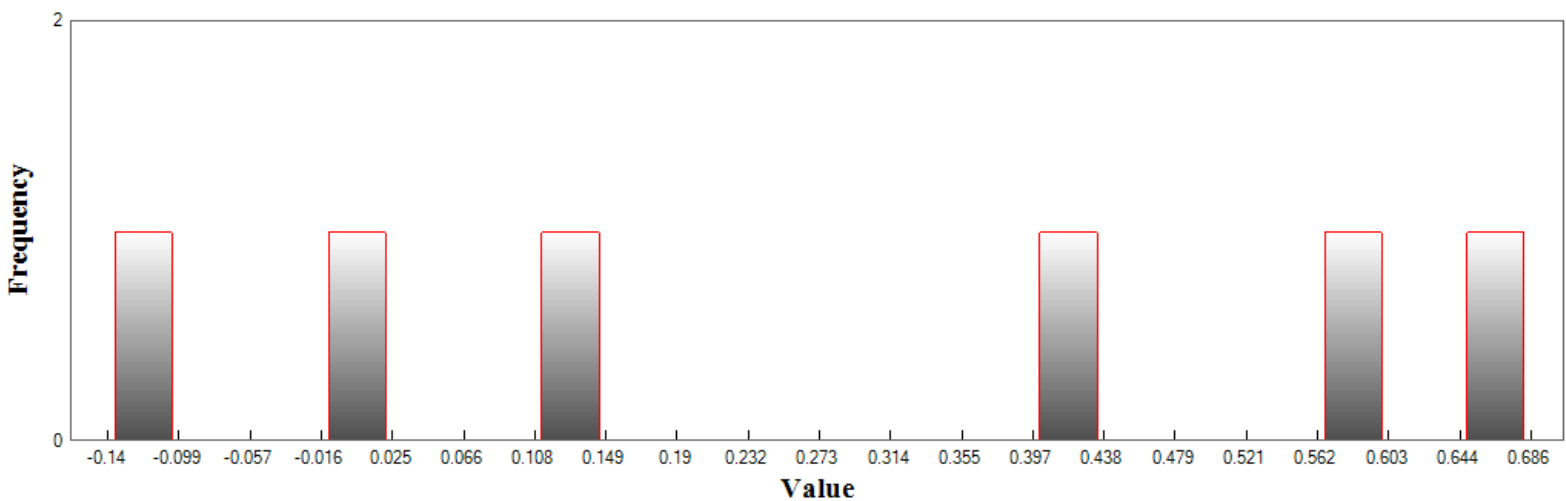


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.14  
Maximum DZ: 0.685  
Mean DZ: 0.278  
Mean Magnitude DZ: 0.57  
Number Observations: 6  
Standard Deviation DZ: 0.332  
RMSE Z: 0.412  
95th Percentile: 0.661  
Units: US Survey Feet

## Histogram



Min: -0.14

Max: 0.685

Number Of Bins: 20

Bin Interval: 0.041

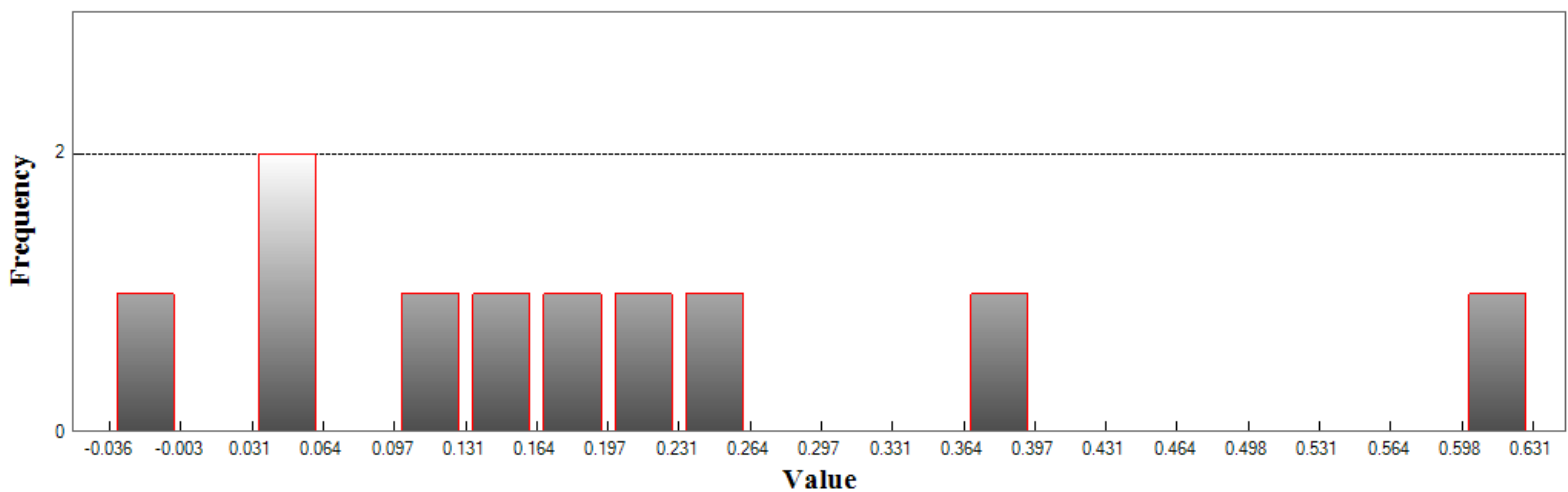


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.037  
Maximum DZ: 0.631  
Mean DZ: 0.195  
Mean Magnitude DZ: 0.45  
Number Observations: 10  
Standard Deviation DZ: 0.196  
RMSE Z: 0.27  
95th Percentile: 0.525  
Units: US Survey Feet

## Histogram



Min: -0.037

Max: 0.631

Number Of Bins: 20

Bin Interval: 0.033

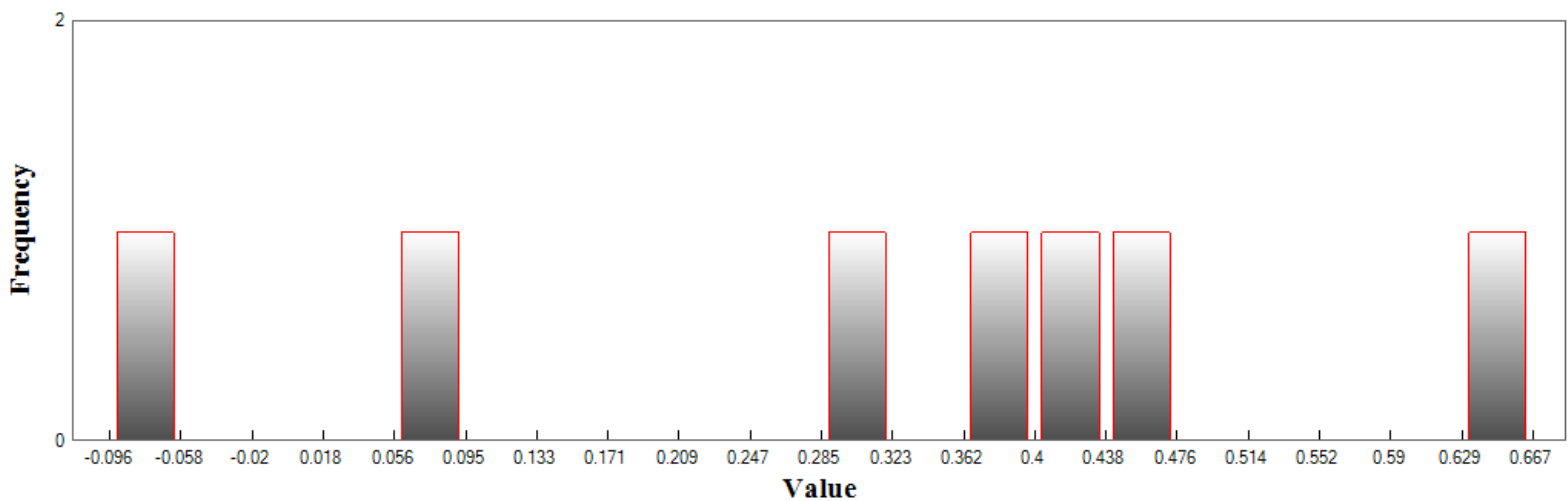


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.096  
Maximum DZ: 0.667  
Mean DZ: 0.317  
Mean Magnitude DZ: 0.587  
Number Observations: 7  
Standard Deviation DZ: 0.255  
RMSE Z: 0.395  
95th Percentile: 0.605  
Units: US Survey Feet

## Histogram



Min: -0.096

Max: 0.667

Number Of Bins: 20

Bin Interval: 0.038



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2H, 2M

Minimum DZ: -0.14

Maximum DZ: 0.685

Mean DZ: 0.26

Mean Magnitude DZ: 0.542

Number Observations: 20

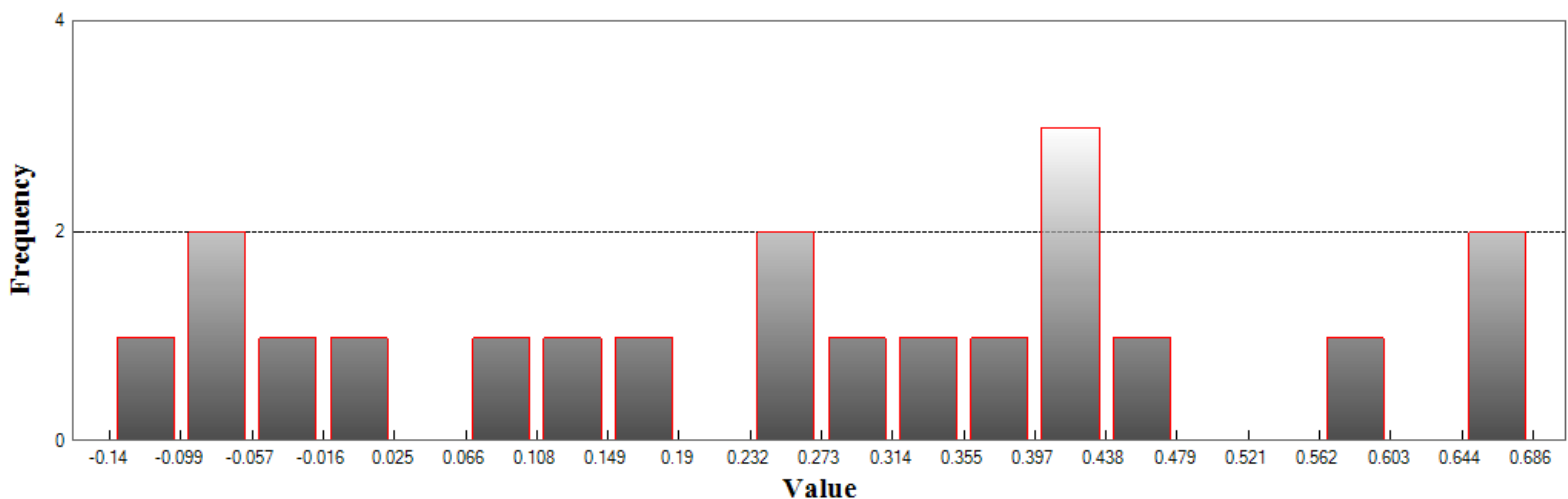
Standard Deviation DZ: 0.251

RMSE Z: 0.357

95th Percentile: 0.668

Units: US Survey Feet

## Histogram



Min: -0.14

Max: 0.685

Number Of Bins: 20

Bin Interval: 0.041



**NORTH CAROLINA GEODETIC SURVEY**

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



---

## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/23/2015 Finish: 3/23/2015

---

## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute:

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute:

LAS:

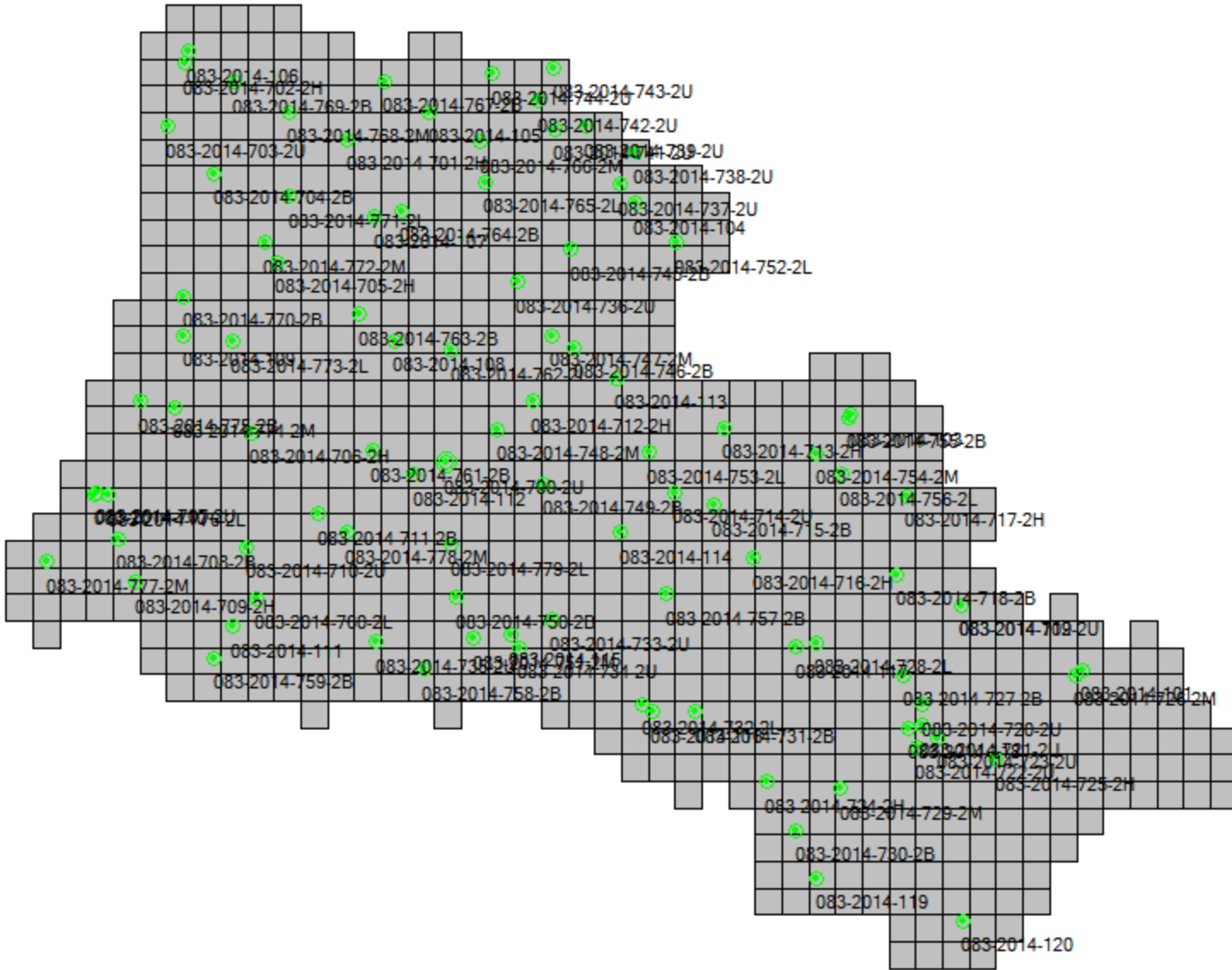
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\HalifaxCoNC\Masspoints

Number of Data Files Matching Attribute:



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	99			
2U	21	0.482	0.408	
2H	11		0.353	0.353
2B	43	0.392	0.343	
2M	12		0.894	0.894
2L	12		0.570	0.570
Total	99			

Units: US Survey Feet

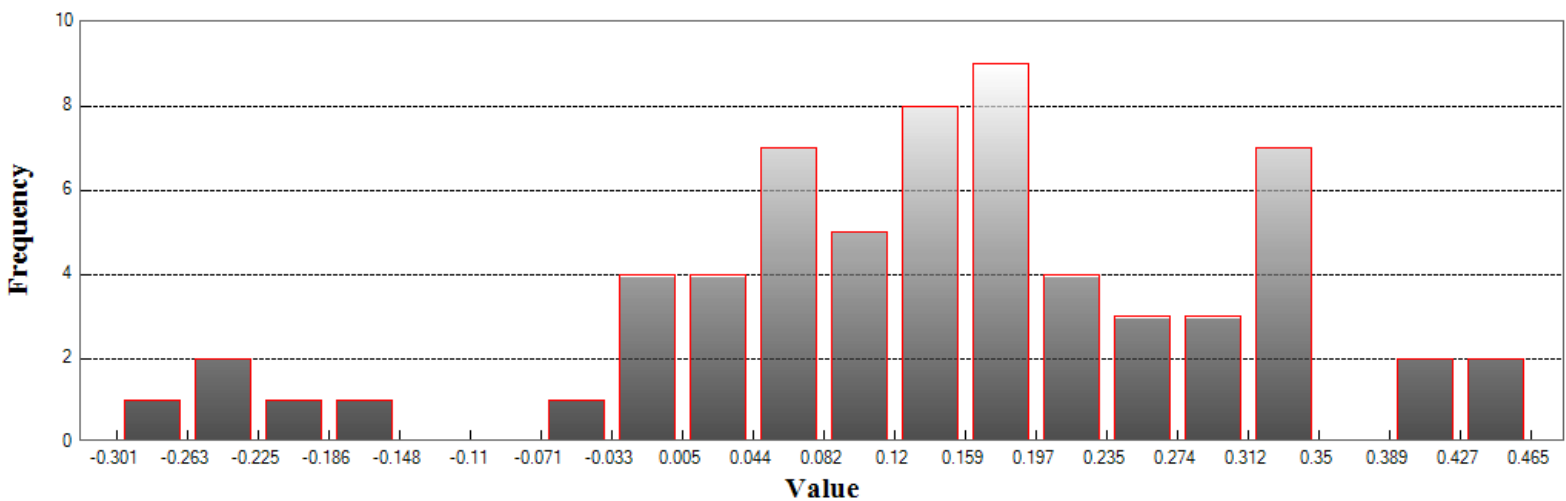


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B  
Minimum DZ: -0.301  
Maximum DZ: 0.465  
Mean DZ: 0.143  
Mean Magnitude DZ: 0.427  
Number Observations: 64  
Standard Deviation DZ: 0.163  
RMSE Z: 0.216  
95% Confidence Level Z: 0.424  
Units: US Survey Feet

# Histogram



Min: -0.301  
Max: 0.465  
Number Of Bins: 20  
Bin Interval: 0.038

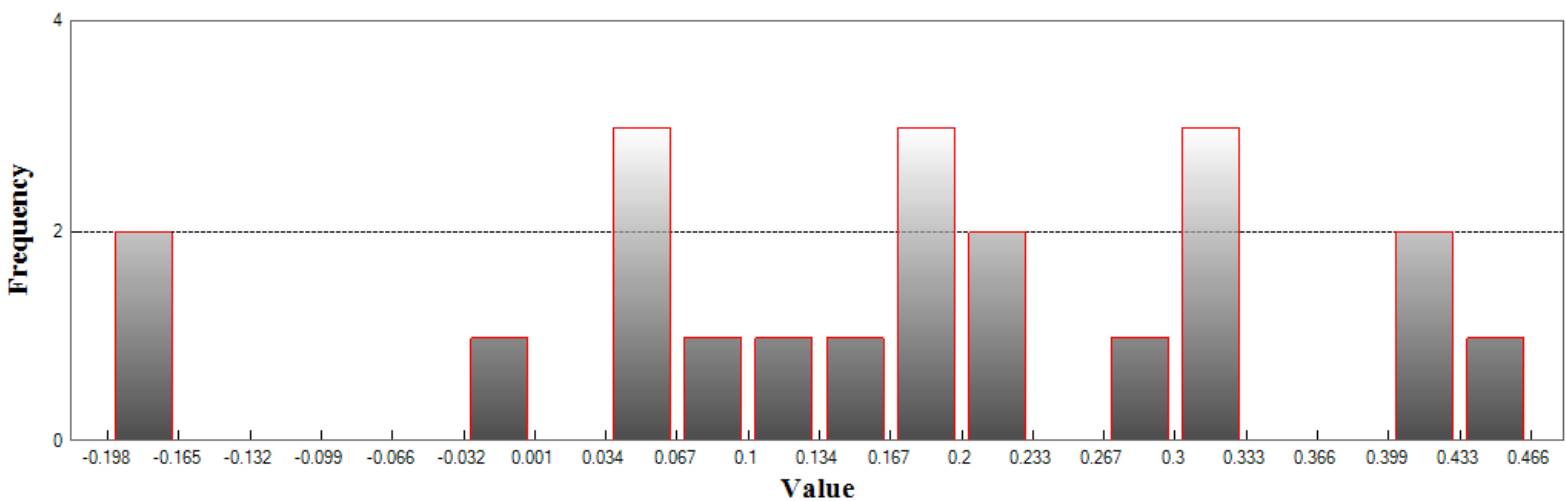


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.199  
Maximum DZ: 0.465  
Mean DZ: 0.174  
Mean Magnitude DZ: 0.459  
Number Observations: 21  
Standard Deviation DZ: 0.178  
RMSE Z: 0.246  
95th Percentile: 0.408  
Units: US Survey Feet

## Histogram



Min: -0.199

Max: 0.465

Number Of Bins: 20

Bin Interval: 0.033

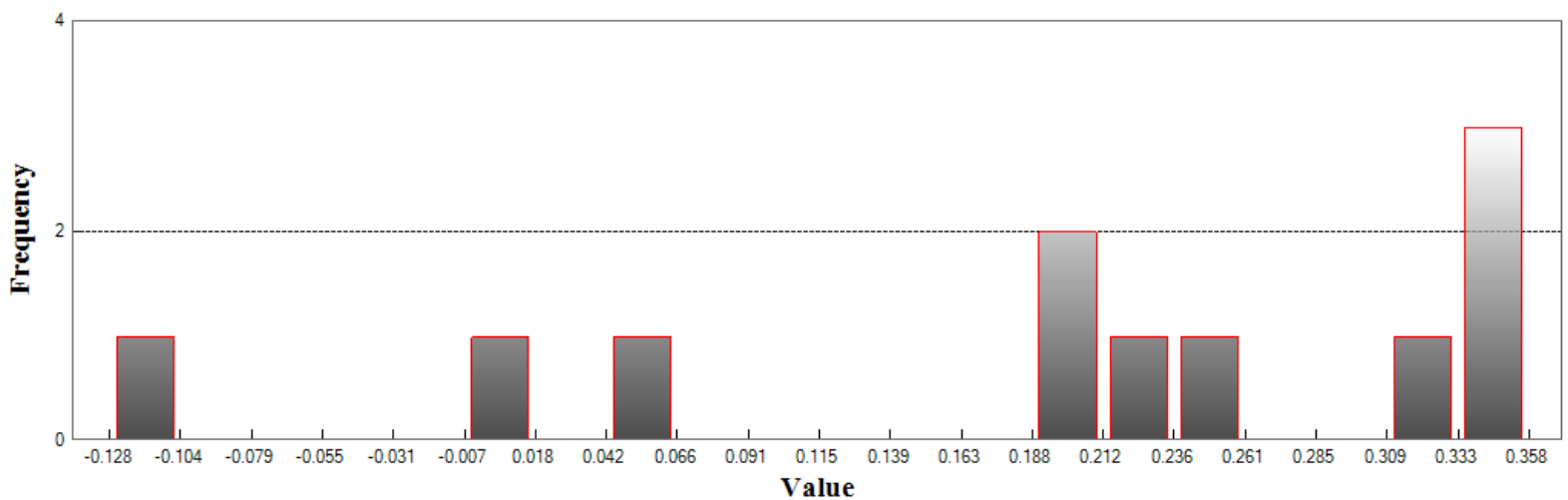


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.128  
Maximum DZ: 0.358  
Mean DZ: 0.197  
Mean Magnitude DZ: 0.47  
Number Observations: 11  
Standard Deviation DZ: 0.158  
RMSE Z: 0.248  
95th Percentile: 0.353  
Units: US Survey Feet

## Histogram



Min: -0.128

Max: 0.358

Number Of Bins: 20

Bin Interval: 0.024

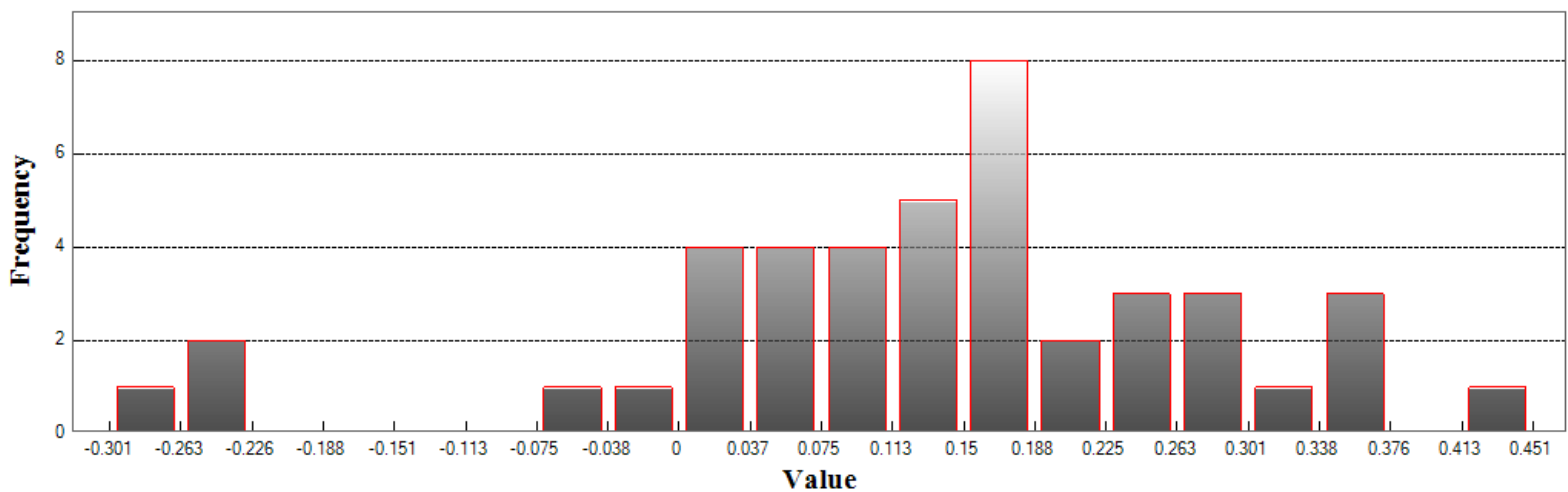


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.301  
Maximum DZ: 0.451  
Mean DZ: 0.128  
Mean Magnitude DZ: 0.411  
Number Observations: 43  
Standard Deviation DZ: 0.156  
RMSE Z: 0.2  
95th Percentile: 0.343  
Units: US Survey Feet

## Histogram



Min: -0.301

Max: 0.451

Number Of Bins: 20

Bin Interval: 0.038

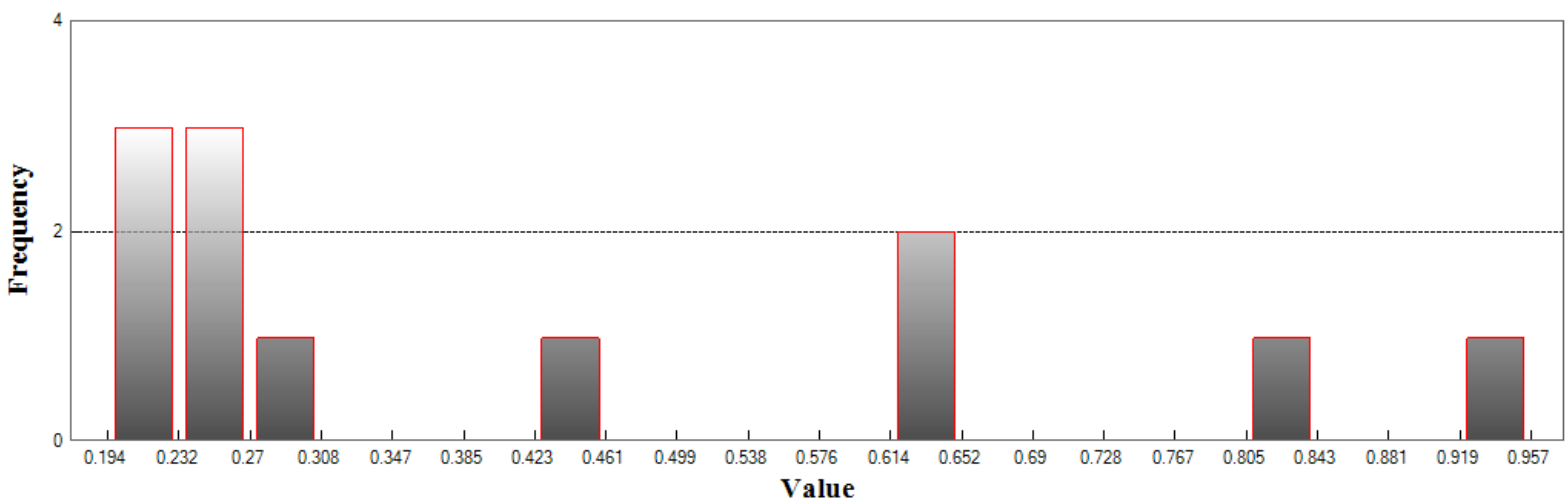


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: 0.194  
Maximum DZ: 0.958  
Mean DZ: 0.431  
Mean Magnitude DZ: 0.657  
Number Observations: 12  
Standard Deviation DZ: 0.272  
RMSE Z: 0.504  
95th Percentile: 0.894  
Units: US Survey Feet

## Histogram



Min: 0.194

Max: 0.958

Number Of Bins: 20

Bin Interval: 0.038



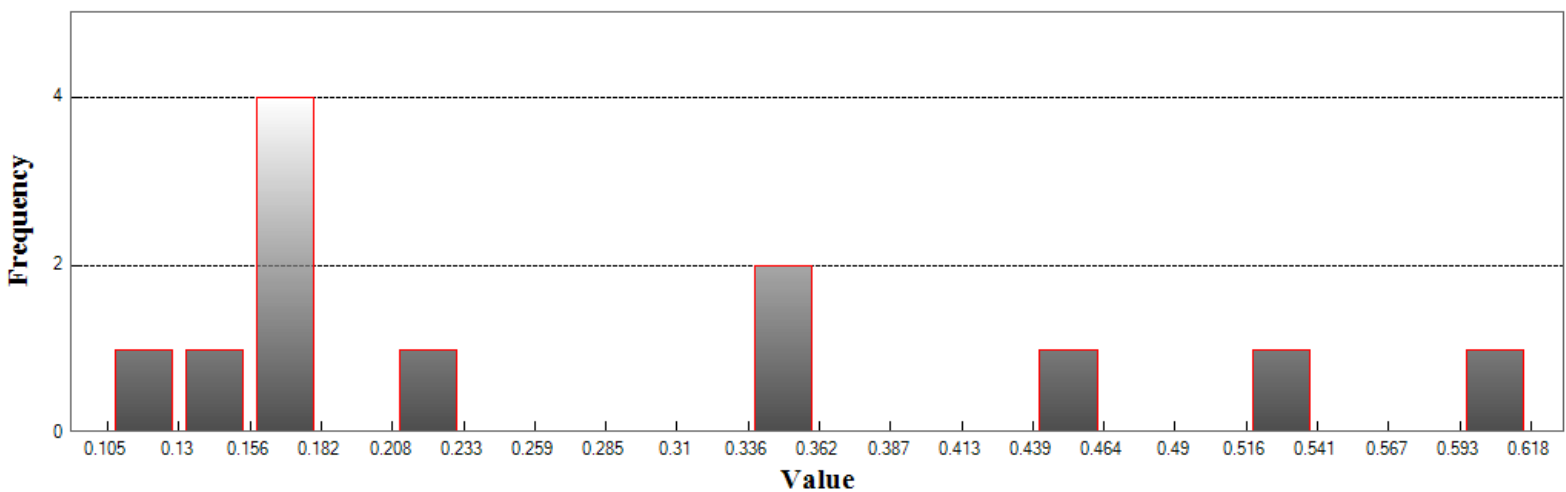


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: 0.105  
Maximum DZ: 0.618  
Mean DZ: 0.284  
Mean Magnitude DZ: 0.533  
Number Observations: 12  
Standard Deviation DZ: 0.169  
RMSE Z: 0.327  
95th Percentile: 0.57  
Units: US Survey Feet

## Histogram



Min: 0.105

Max: 0.618

Number Of Bins: 20

Bin Interval: 0.026



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2H, 2M, 2L

Minimum DZ: -0.128

Maximum DZ: 0.958

Mean DZ: 0.307

Mean Magnitude DZ: 0.561

Number Observations: 35

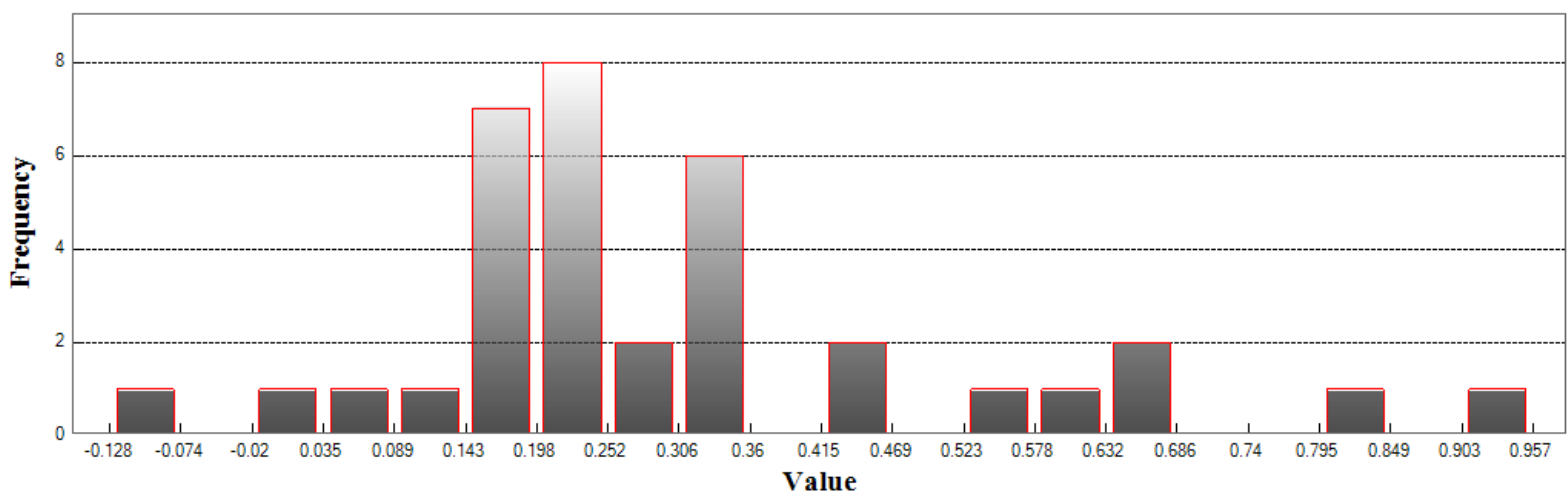
Standard Deviation DZ: 0.224

RMSE Z: 0.378

95th Percentile: 0.709

Units: US Survey Feet

## Histogram



Min: -0.128

Max: 0.958

Number Of Bins: 20

Bin Interval: 0.054

**NORTH CAROLINA GEODETIC SURVEY**

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



---

## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/26/2015 Finish: 3/26/2015

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## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

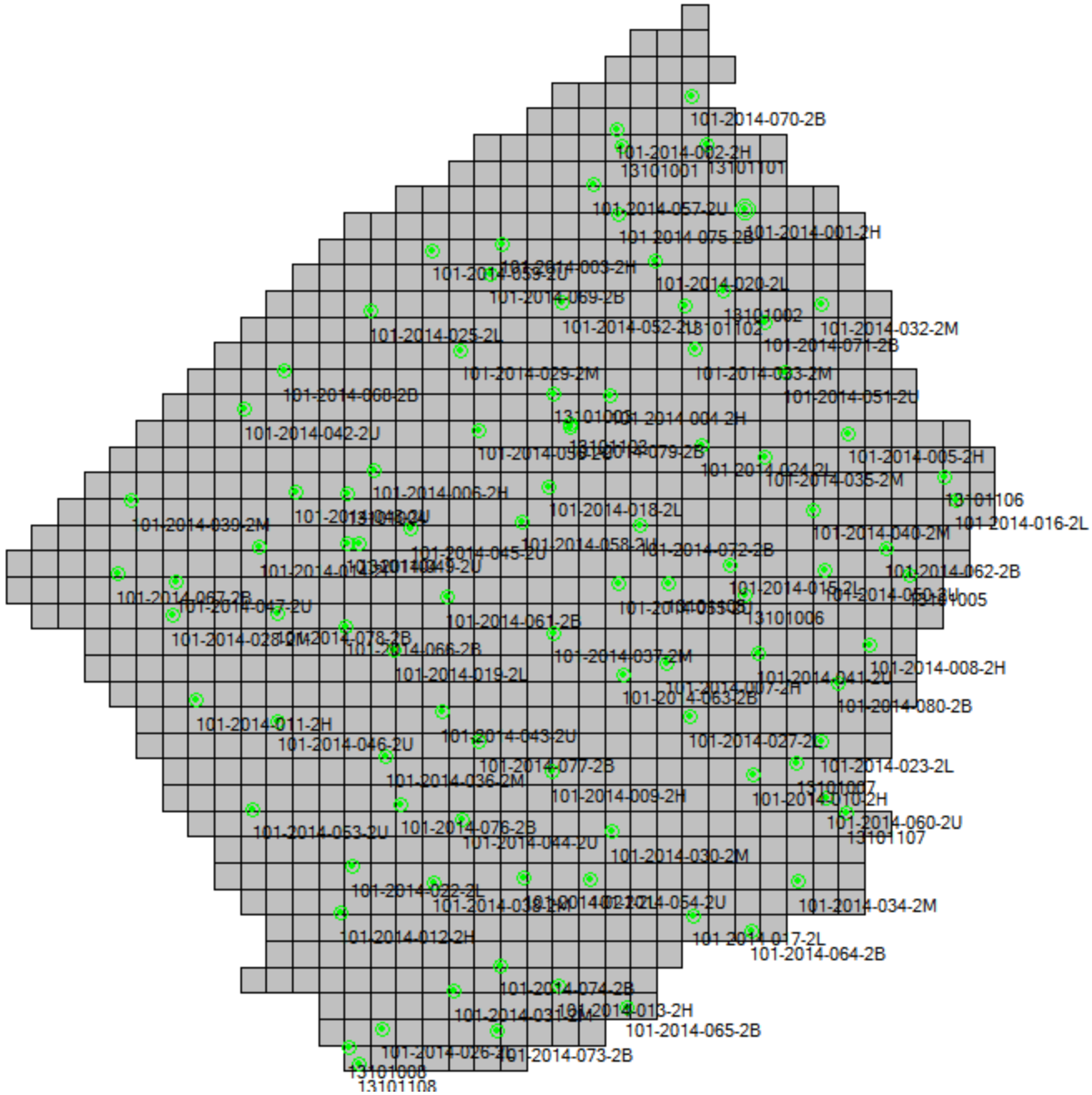
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\JohnstonCoNC\Masspoints

Number of Data Files Matching Attribute: 932 out of 932



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	96			
2H	13		0.412	0.412
2L	14		0.459	0.459
2M	13		0.747	0.747
2U	20	0.262	0.229	
2B	36	0.408	0.341	
Total	96			

Units: US Survey Feet

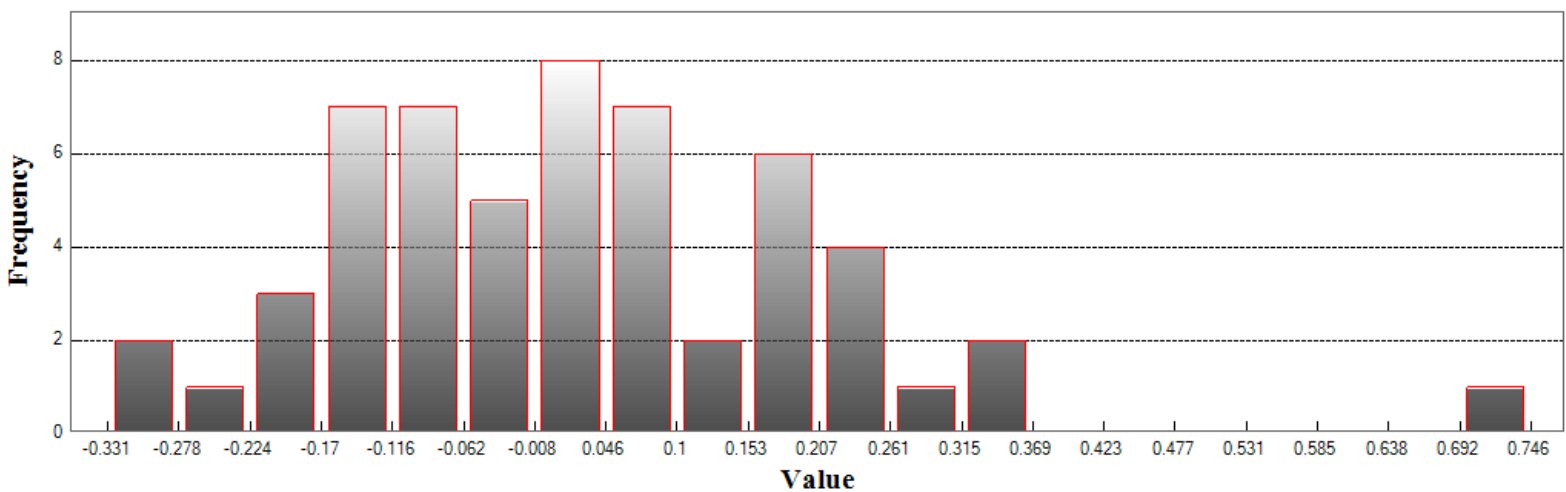


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B  
Minimum DZ: -0.332  
Maximum DZ: 0.746  
Mean DZ: 0.026  
Mean Magnitude DZ: 0.375  
Number Observations: 56  
Standard Deviation DZ: 0.185  
RMSE Z: 0.185  
95% Confidence Level Z: 0.363  
Units: US Survey Feet

# Histogram



Min: -0.332  
Max: 0.746  
Number Of Bins: 20  
Bin Interval: 0.054

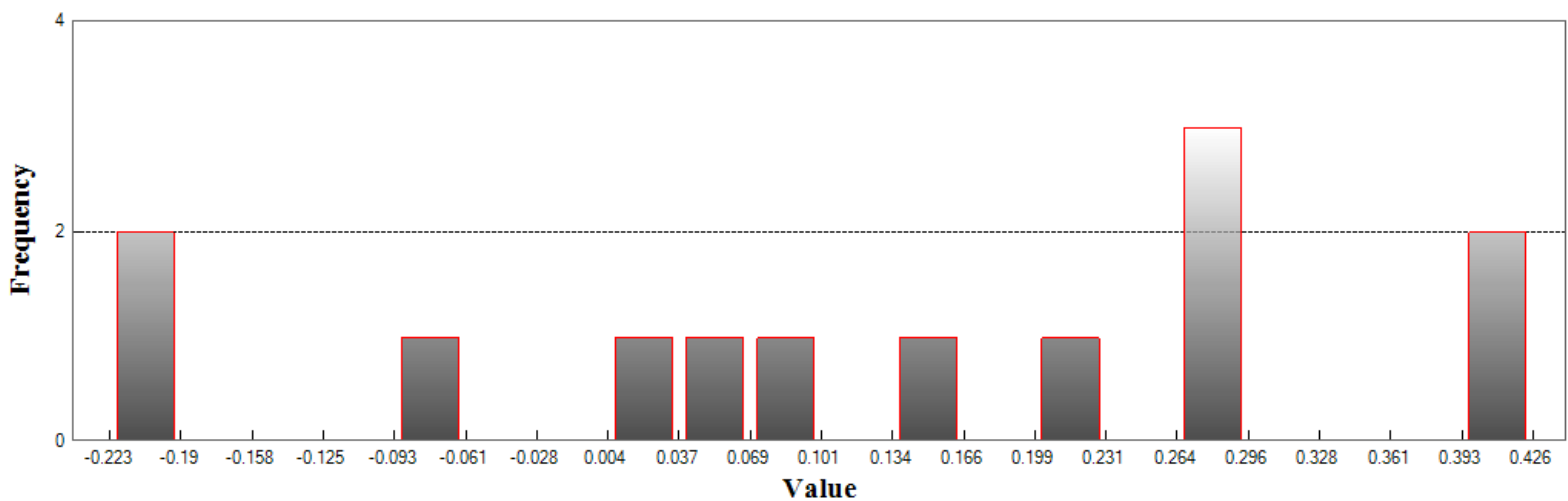


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.222  
Maximum DZ: 0.426  
Mean DZ: 0.129  
Mean Magnitude DZ: 0.452  
Number Observations: 13  
Standard Deviation DZ: 0.208  
RMSE Z: 0.238  
95th Percentile: 0.412  
Units: US Survey Feet

## Histogram



Min: -0.222

Max: 0.426

Number Of Bins: 20

Bin Interval: 0.032

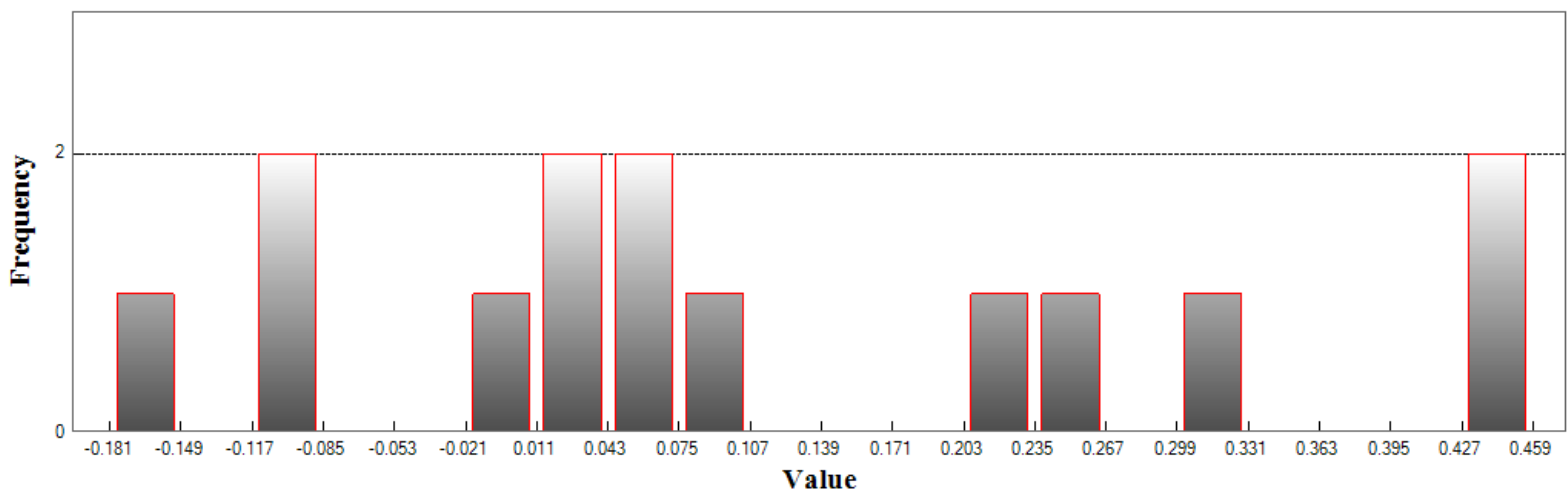


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.181  
Maximum DZ: 0.459  
Mean DZ: 0.113  
Mean Magnitude DZ: 0.409  
Number Observations: 14  
Standard Deviation DZ: 0.2  
RMSE Z: 0.224  
95th Percentile: 0.459  
Units: US Survey Feet

## Histogram



Min: -0.181

Max: 0.459

Number Of Bins: 20

Bin Interval: 0.032



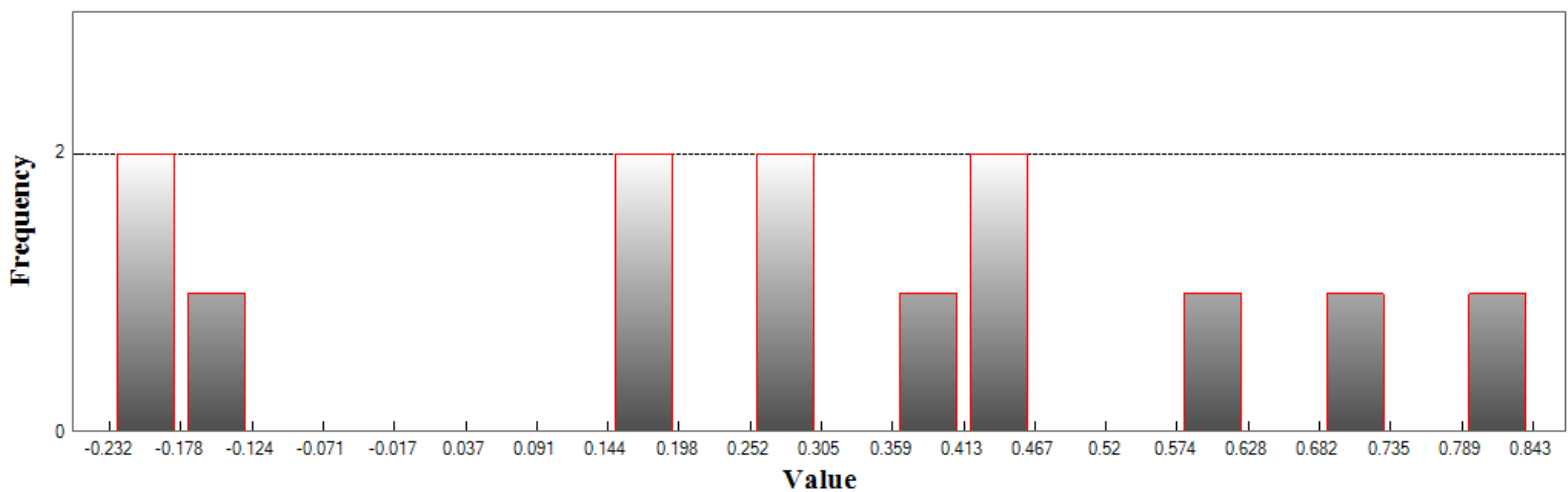


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.232  
Maximum DZ: 0.843  
Mean DZ: 0.291  
Mean Magnitude DZ: 0.616  
Number Observations: 13  
Standard Deviation DZ: 0.334  
RMSE Z: 0.434  
95th Percentile: 0.747  
Units: US Survey Feet

## Histogram



Min: -0.232  
Max: 0.843  
Number Of Bins: 20  
Bin Interval: 0.054

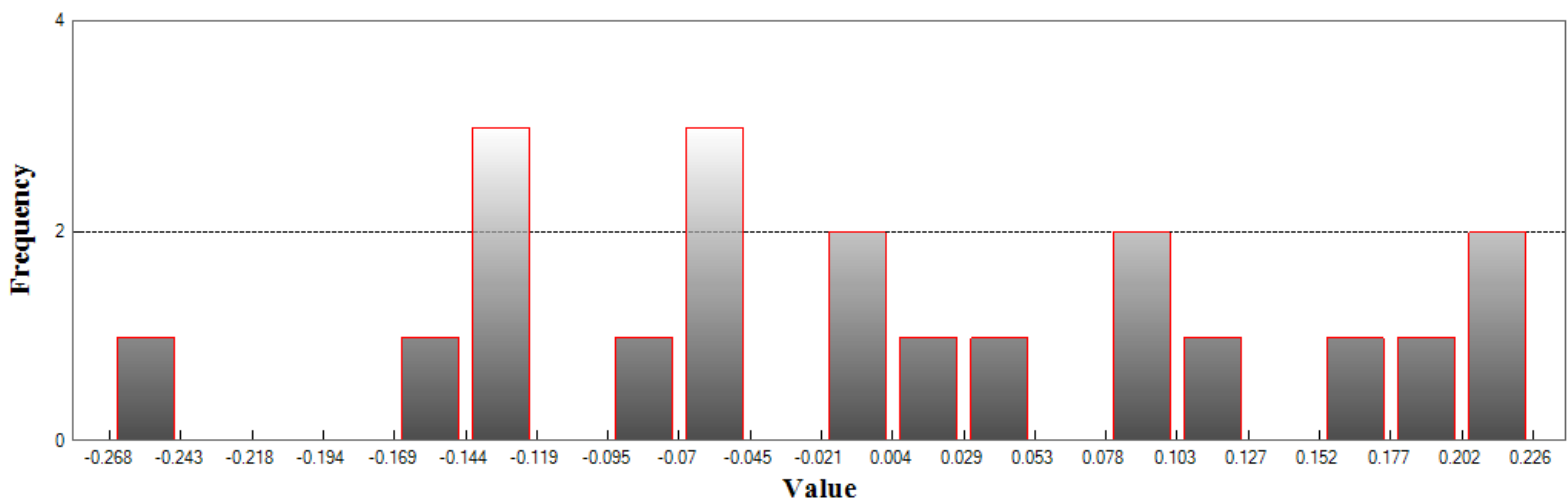


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.267  
Maximum DZ: 0.227  
Mean DZ: 0.002  
Mean Magnitude DZ: 0.335  
Number Observations: 20  
Standard Deviation DZ: 0.137  
RMSE Z: 0.134  
95th Percentile: 0.229  
Units: US Survey Feet

## Histogram



Min: -0.267

Max: 0.227

Number Of Bins: 20

Bin Interval: 0.025

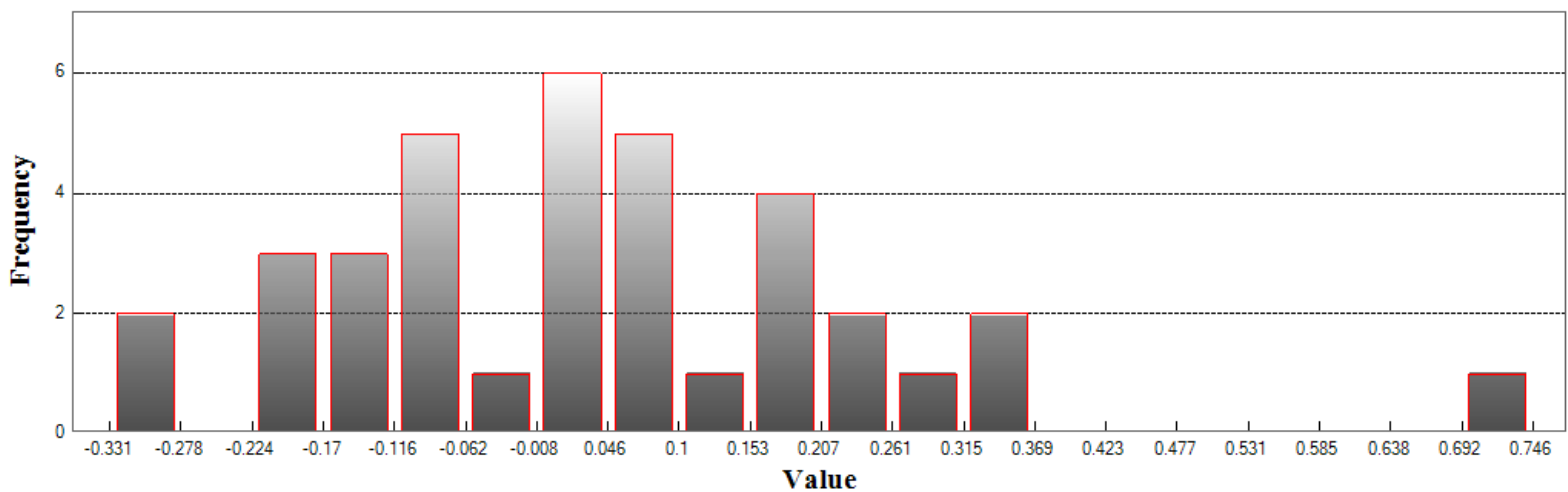


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.332  
Maximum DZ: 0.746  
Mean DZ: 0.04  
Mean Magnitude DZ: 0.395  
Number Observations: 36  
Standard Deviation DZ: 0.207  
RMSE Z: 0.208  
95th Percentile: 0.341  
Units: US Survey Feet

## Histogram



Min: -0.332  
Max: 0.746  
Number Of Bins: 20  
Bin Interval: 0.054



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2H, 2L, 2M

Minimum DZ: -0.232

Maximum DZ: 0.843

Mean DZ: 0.176

Mean Magnitude DZ: 0.498

Number Observations: 40

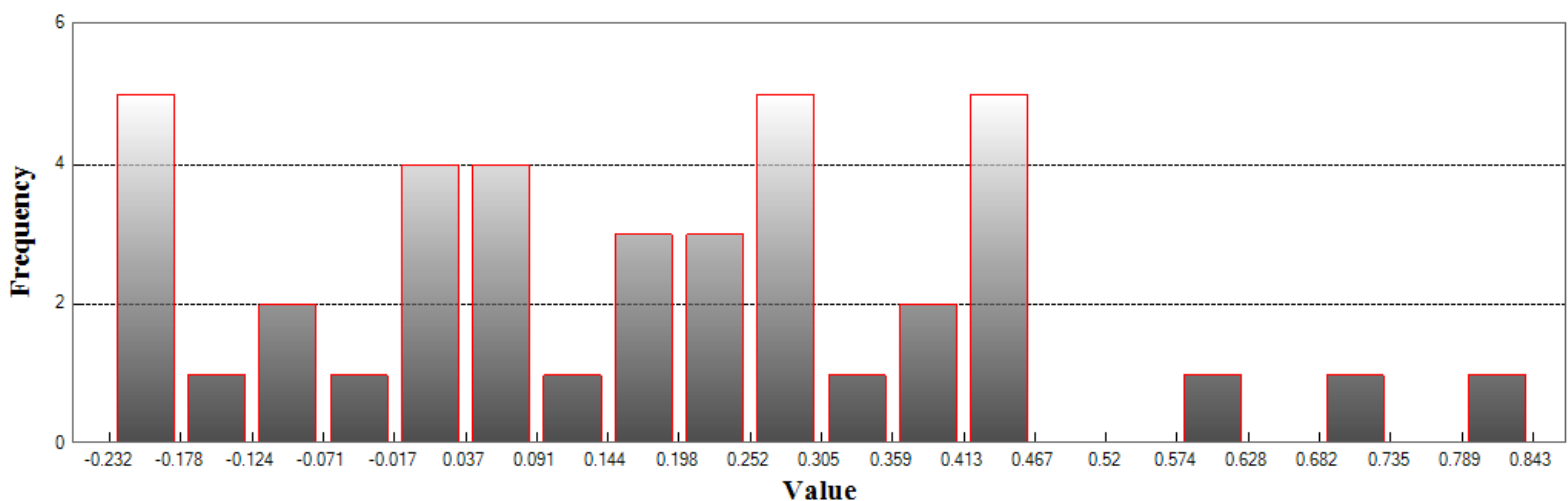
Standard Deviation DZ: 0.26

RMSE Z: 0.312

95th Percentile: 0.595

Units: US Survey Feet

## Histogram



Min: -0.232

Max: 0.843

Number Of Bins: 20

Bin Interval: 0.054

## NORTH CAROLINA GEODETIC SURVEY

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



---

## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 4/2/2015 Finish: 4/2/2015

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## Metadata Information

### Tile Index:

Path: C:\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR\v&m\Lenoir\LenoirCoNC\_Tile

Number of Polys: 0

### Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### LAS:

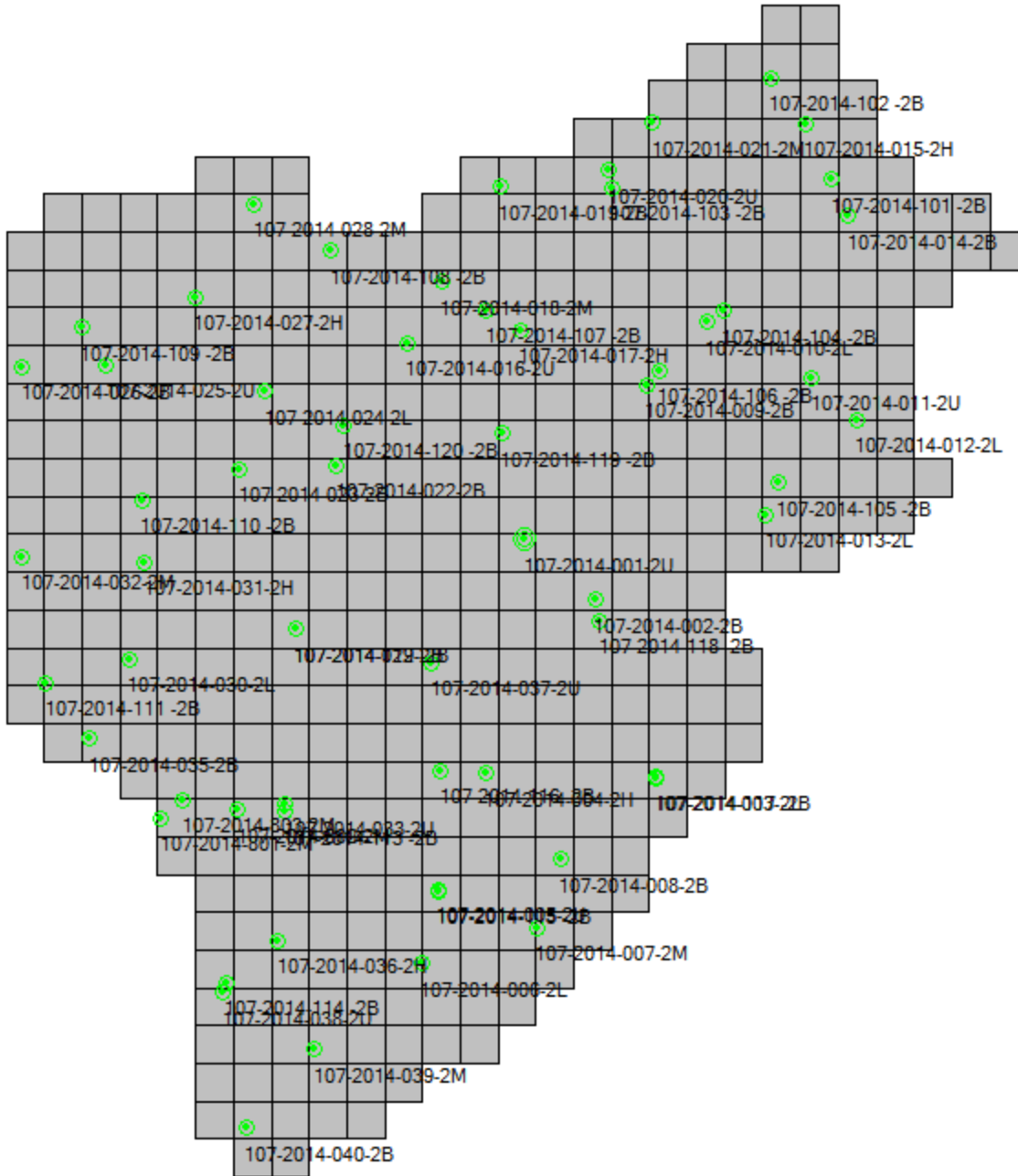
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\LenoirCoNC\Masspoints

Number of Data Files Matching Attribute: 479 out of 479



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	62			
2U	9	0.296	0.302	
2B	31	0.416	0.362	
2L	7		0.486	0.486
2H	6		1.003	1.003
2M	9		0.773	0.773
Total	62			

Units: US Survey Feet

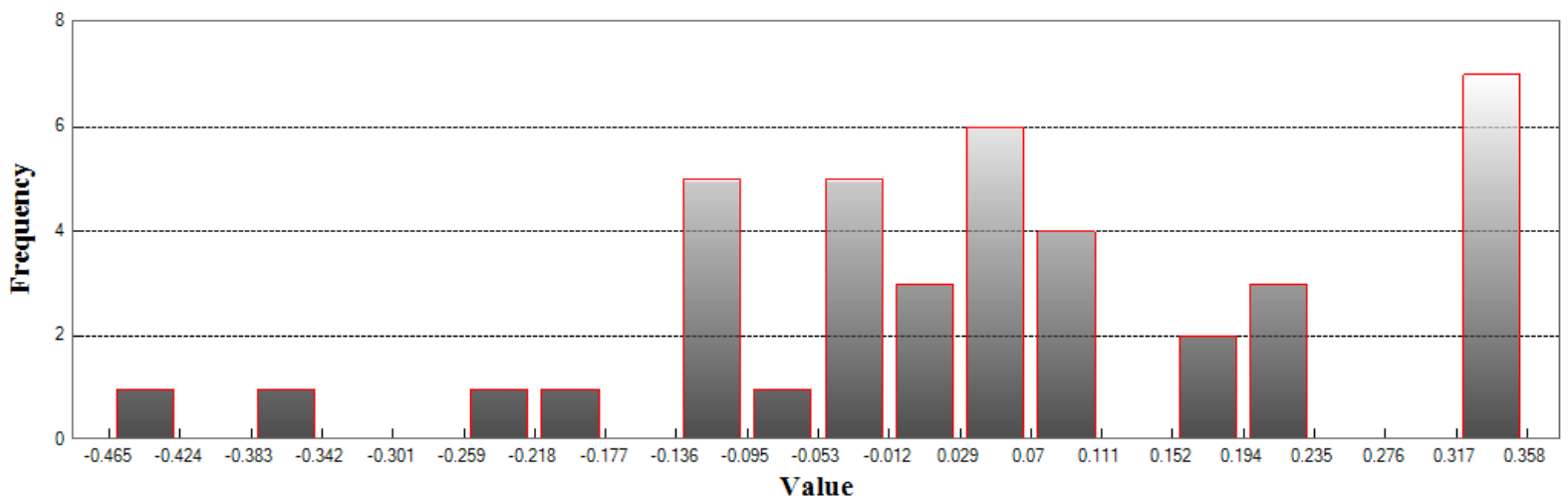


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B  
Minimum DZ: -0.466  
Maximum DZ: 0.358  
Mean DZ: 0.051  
Mean Magnitude DZ: 0.394  
Number Observations: 40  
Standard Deviation DZ: 0.196  
RMSE Z: 0.2  
95% Confidence Level Z: 0.392  
Units: US Survey Feet

# Histogram



Min: -0.466  
Max: 0.358  
Number Of Bins: 20  
Bin Interval: 0.041



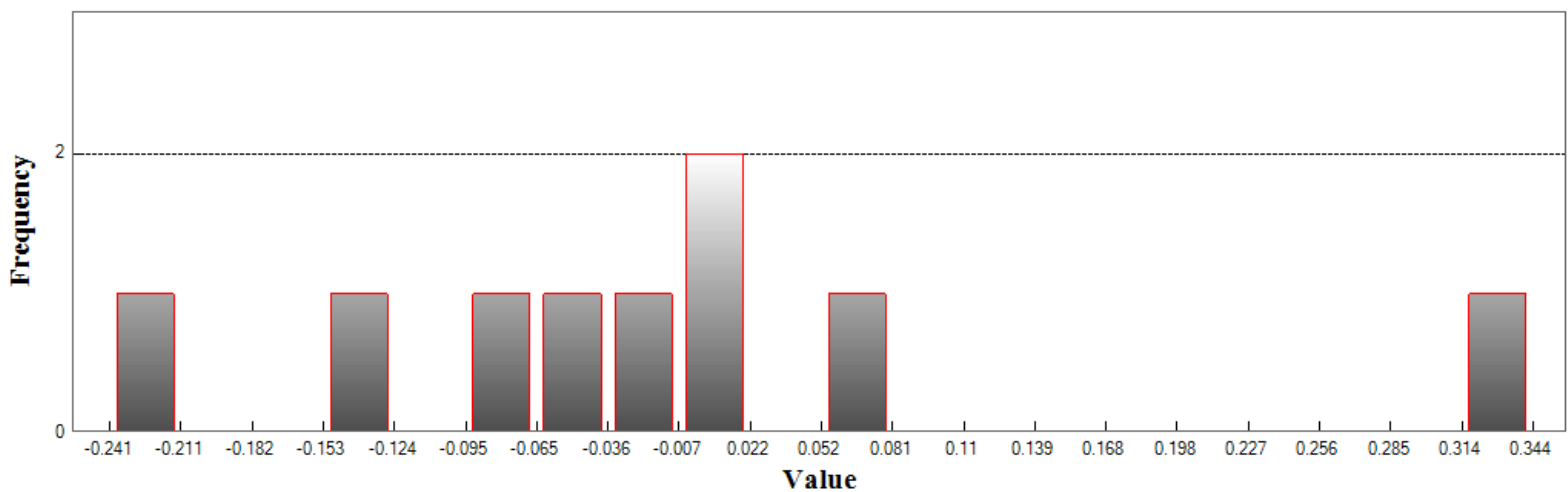


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.241  
Maximum DZ: 0.343  
Mean DZ: -0.008  
Mean Magnitude DZ: 0.324  
Number Observations: 9  
Standard Deviation DZ: 0.16  
RMSE Z: 0.151  
95th Percentile: 0.302  
Units: US Survey Feet

## Histogram



Min: -0.241

Max: 0.343

Number Of Bins: 20

Bin Interval: 0.029

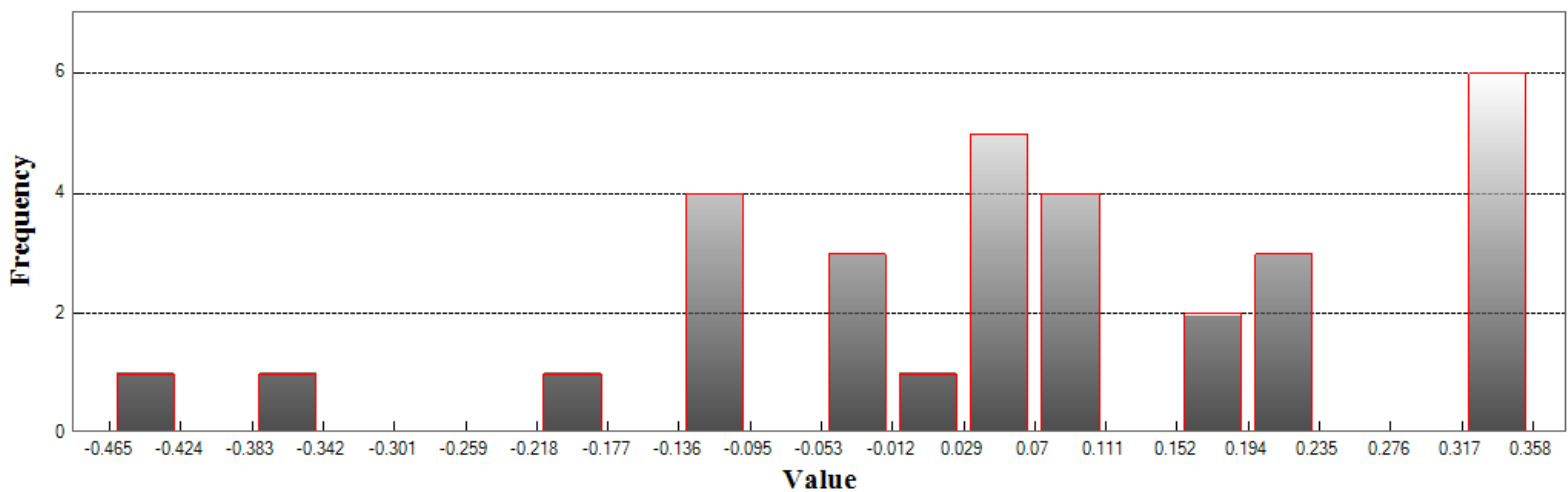


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.466  
Maximum DZ: 0.358  
Mean DZ: 0.068  
Mean Magnitude DZ: 0.412  
Number Observations: 31  
Standard Deviation DZ: 0.204  
RMSE Z: 0.212  
95th Percentile: 0.362  
Units: US Survey Feet

## Histogram



Min: -0.466

Max: 0.358

Number Of Bins: 20

Bin Interval: 0.041

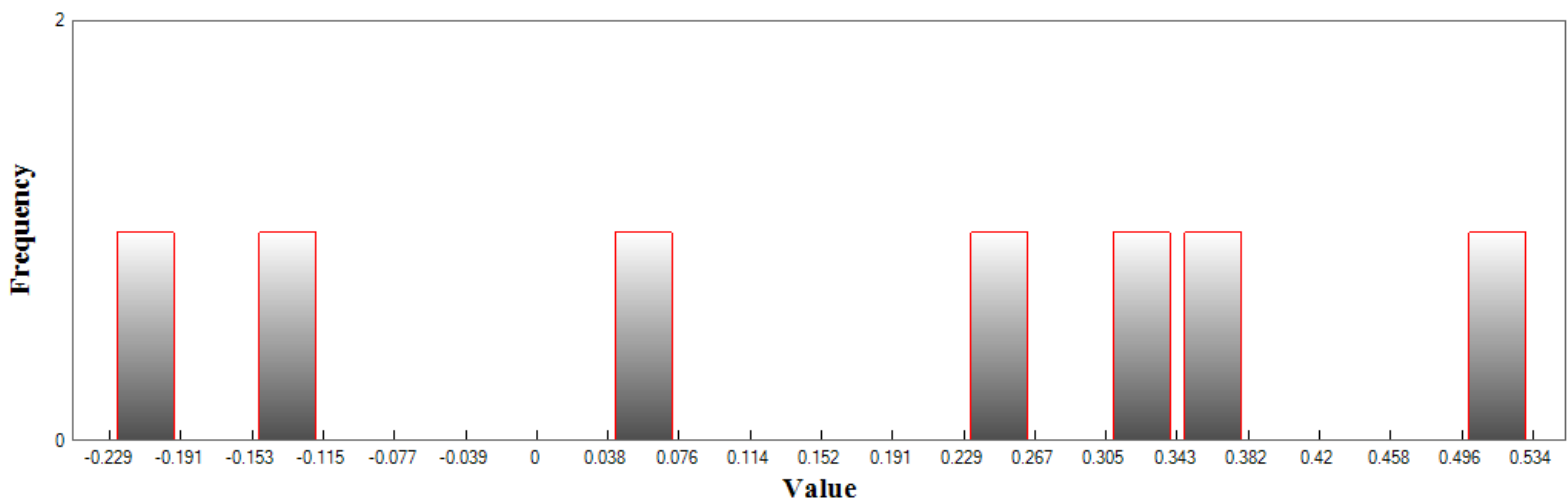


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.229  
Maximum DZ: 0.535  
Mean DZ: 0.169  
Mean Magnitude DZ: 0.522  
Number Observations: 7  
Standard Deviation DZ: 0.277  
RMSE Z: 0.307  
95th Percentile: 0.486  
Units: US Survey Feet

## Histogram



Min: -0.229

Max: 0.535

Number Of Bins: 20

Bin Interval: 0.038

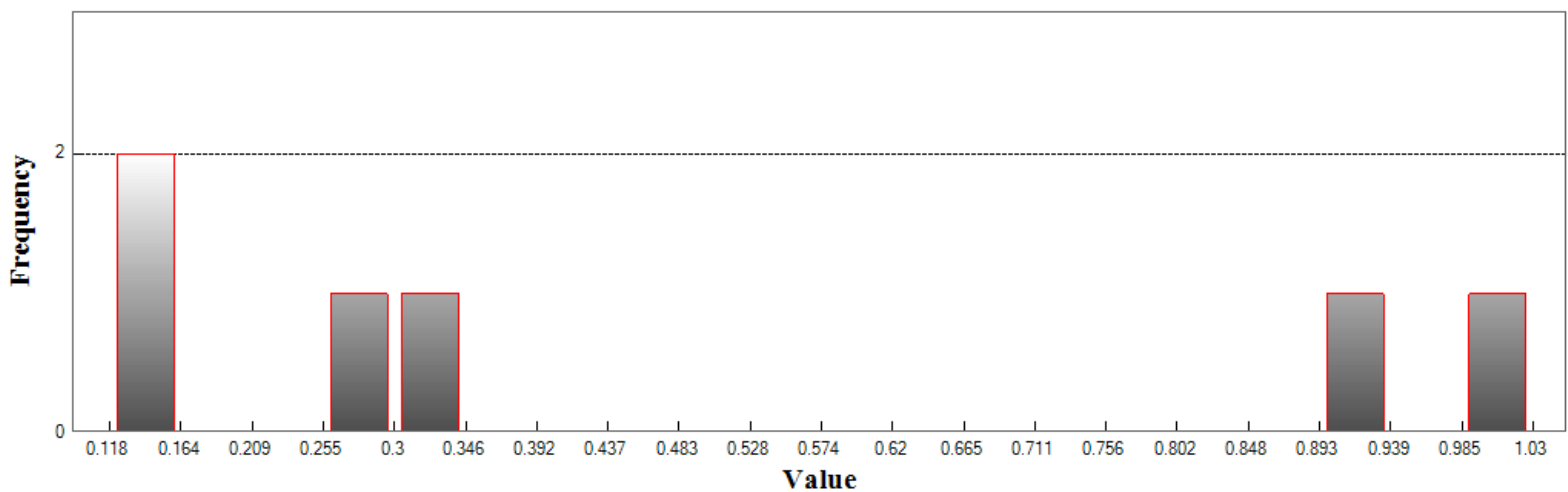


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: 0.118  
Maximum DZ: 1.03  
Mean DZ: 0.466  
Mean Magnitude DZ: 0.683  
Number Observations: 6  
Standard Deviation DZ: 0.404  
RMSE Z: 0.594  
95th Percentile: 1.003  
Units: US Survey Feet

## Histogram



Min: 0.118

Max: 1.03

Number Of Bins: 20

Bin Interval: 0.046

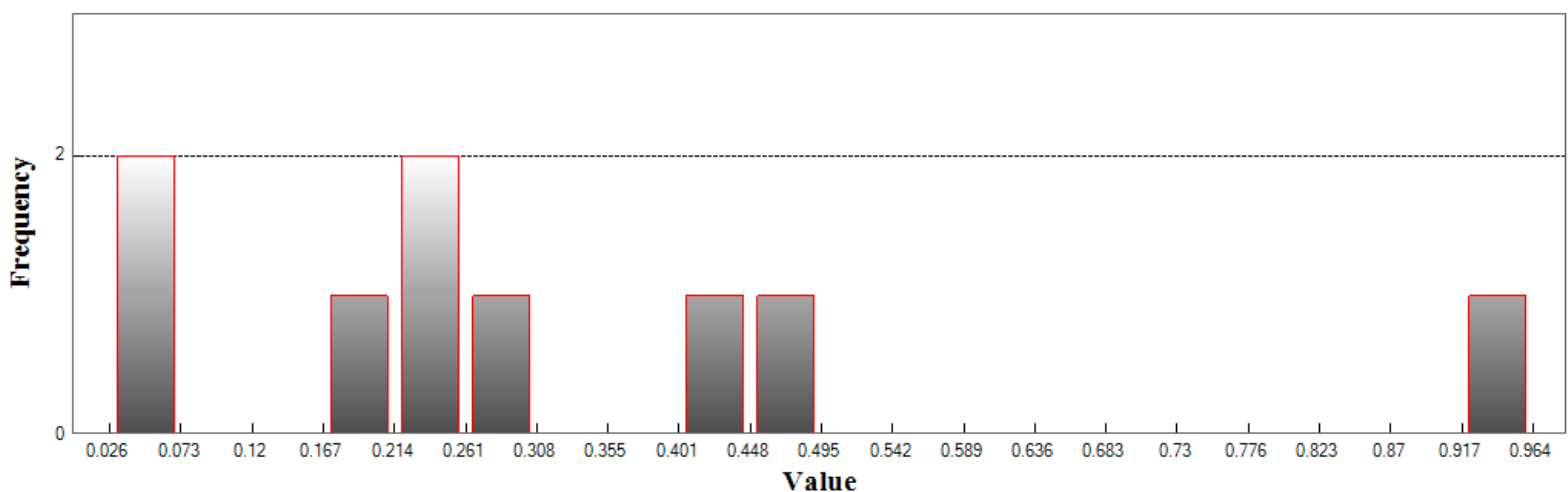


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: 0.027  
Maximum DZ: 0.964  
Mean DZ: 0.334  
Mean Magnitude DZ: 0.578  
Number Observations: 9  
Standard Deviation DZ: 0.28  
RMSE Z: 0.426  
95th Percentile: 0.773  
Units: US Survey Feet

## Histogram



Min: 0.027

Max: 0.964

Number Of Bins: 20

Bin Interval: 0.047



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2H, 2M

Minimum DZ: -0.229

Maximum DZ: 1.03

Mean DZ: 0.318

Mean Magnitude DZ: 0.592

Number Observations: 22

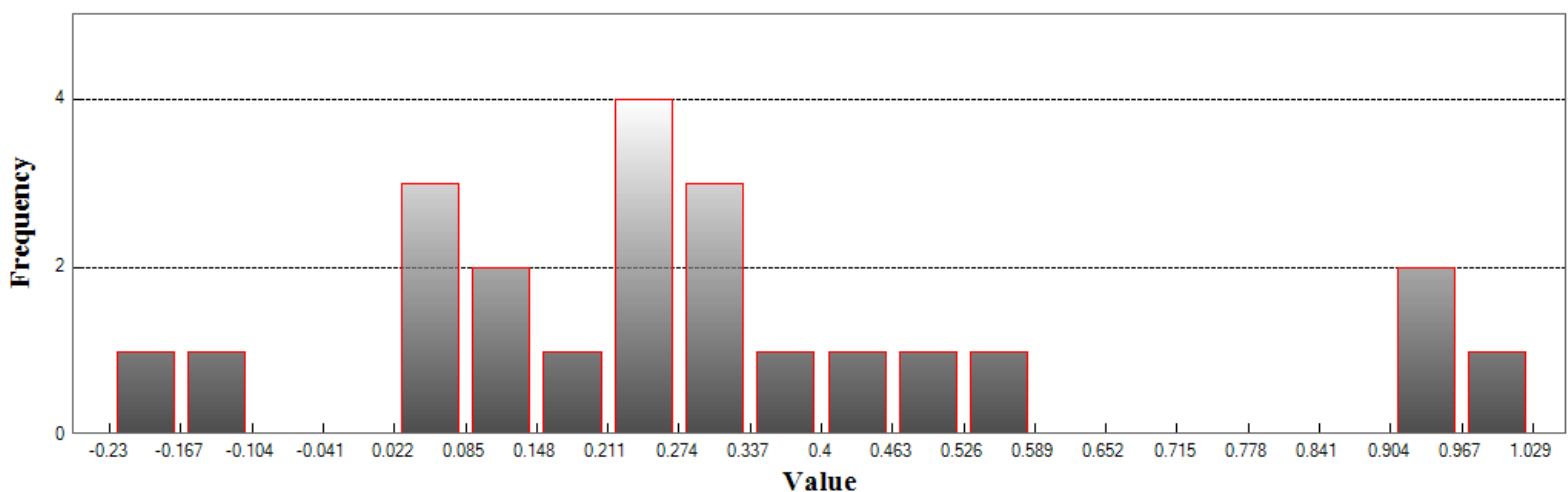
Standard Deviation DZ: 0.323

RMSE Z: 0.448

95th Percentile: 0.962

Units: US Survey Feet

## Histogram



Min: -0.229

Max: 1.03

Number Of Bins: 20

Bin Interval: 0.063

**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: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/24/2015 Finish: 3/24/2015

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## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

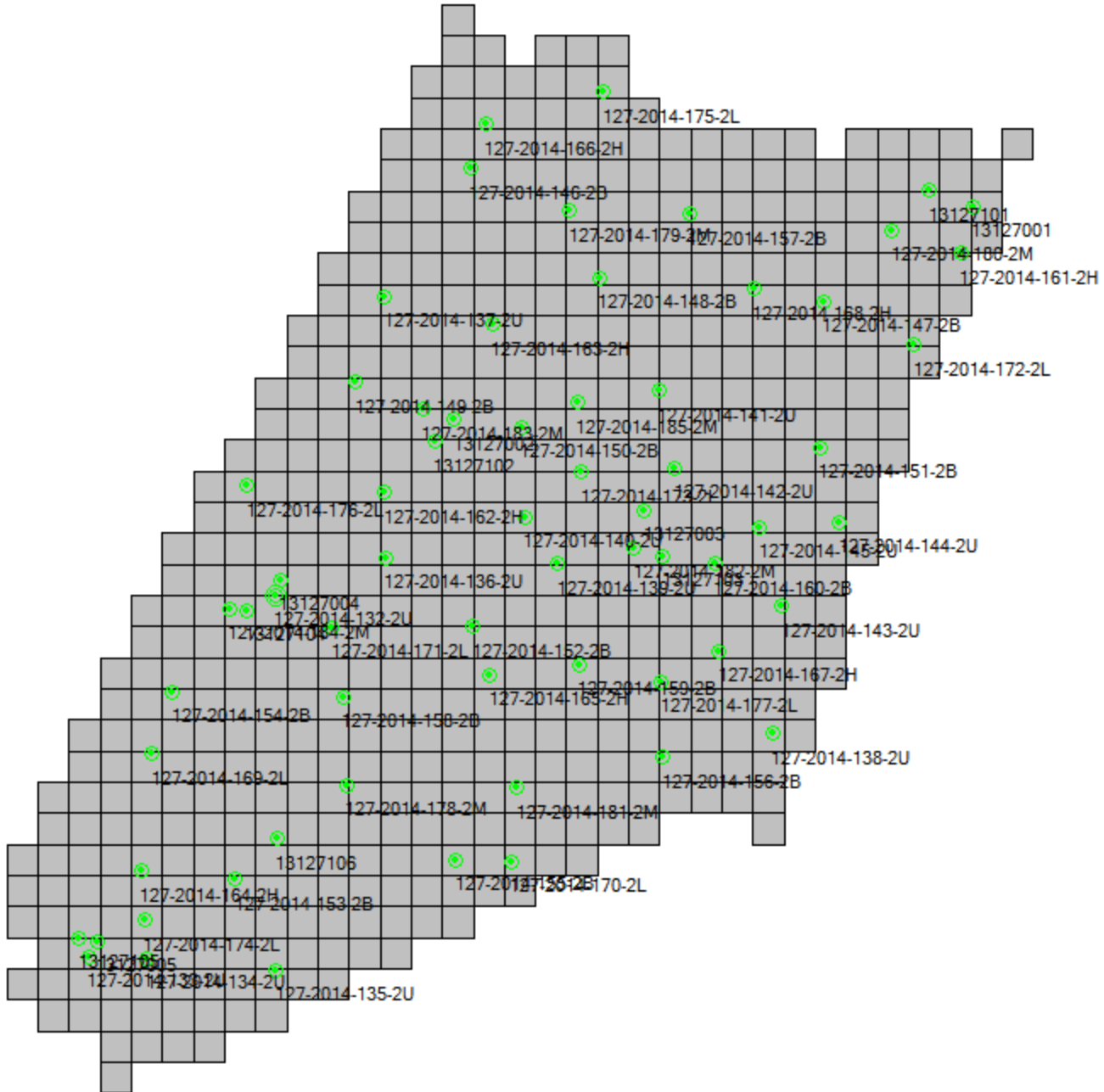
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\NashCoNC\Masspoints

Number of Data Files Matching Attribute: 611 out of 611



## Tiled-Data Area







LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	65			
2U	25	0.323	0.306	
2B	15	0.385	0.308	
2H	8		0.881	0.881
2L	9		0.686	0.686
2M	8		0.360	0.360
Total	65			

Units: US Survey Feet



# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B

Minimum DZ: -0.298

Maximum DZ: 0.359

Mean DZ: 0.044

Mean Magnitude DZ: 0.386

Number Observations: 40

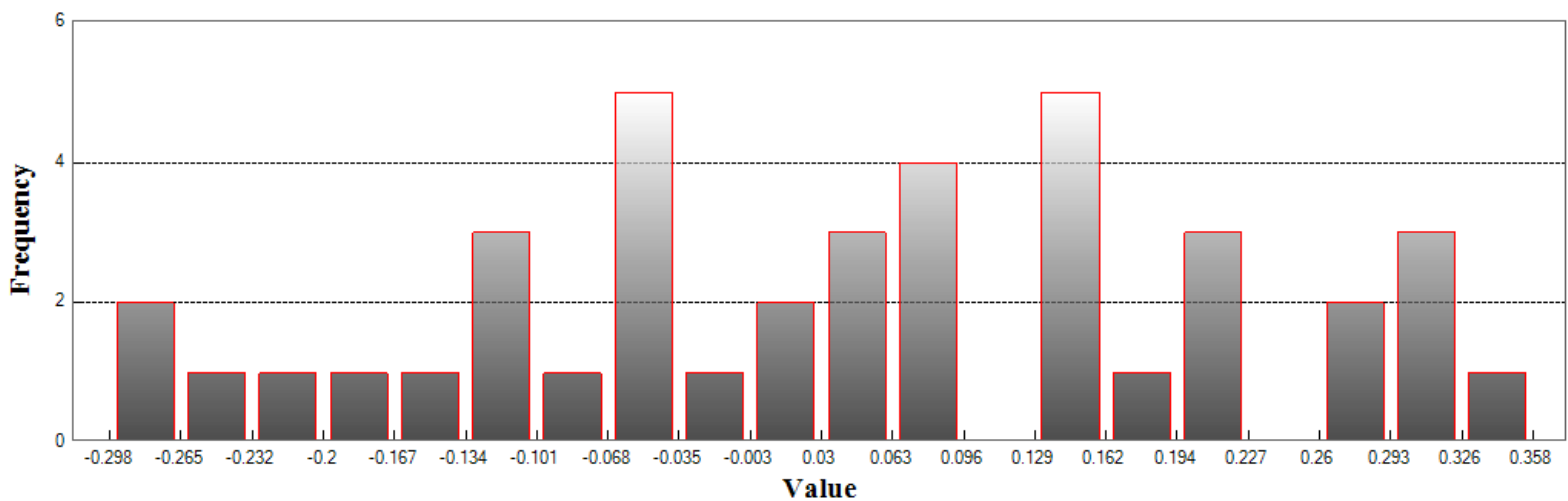
Standard Deviation DZ: 0.174

RMSE Z: 0.177

95% Confidence Level Z: 0.348

Units: US Survey Feet

# Histogram



Min: -0.298

Max: 0.359

Number Of Bins: 20

Bin Interval: 0.033

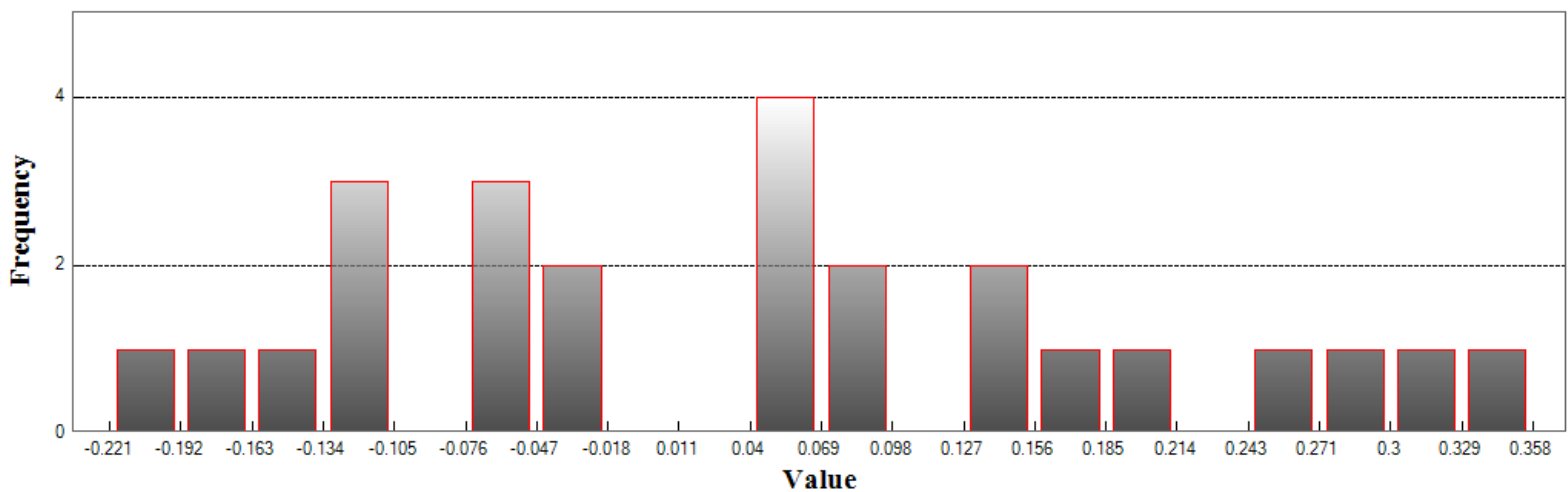


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.221  
Maximum DZ: 0.359  
Mean DZ: 0.045  
Mean Magnitude DZ: 0.371  
Number Observations: 25  
Standard Deviation DZ: 0.162  
RMSE Z: 0.165  
95th Percentile: 0.306  
Units: US Survey Feet

## Histogram



Min: -0.221

Max: 0.359

Number Of Bins: 20

Bin Interval: 0.029

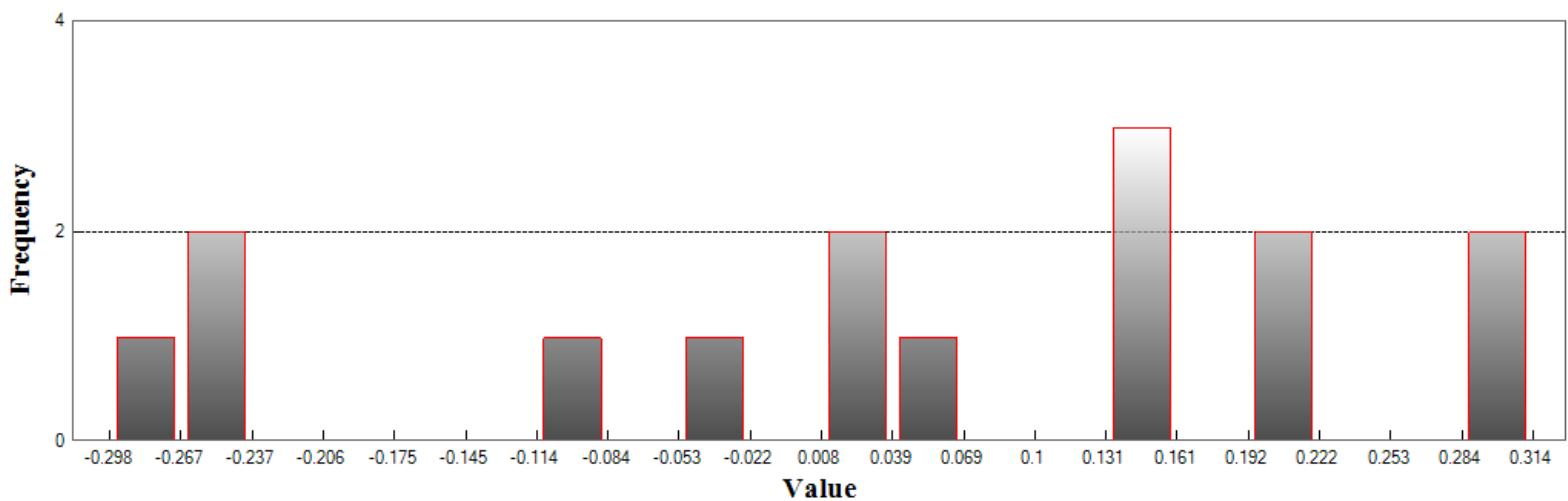


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.298  
Maximum DZ: 0.315  
Mean DZ: 0.043  
Mean Magnitude DZ: 0.41  
Number Observations: 15  
Standard Deviation DZ: 0.199  
RMSE Z: 0.196  
95th Percentile: 0.308  
Units: US Survey Feet

## Histogram



Min: -0.298  
Max: 0.315  
Number Of Bins: 20  
Bin Interval: 0.031

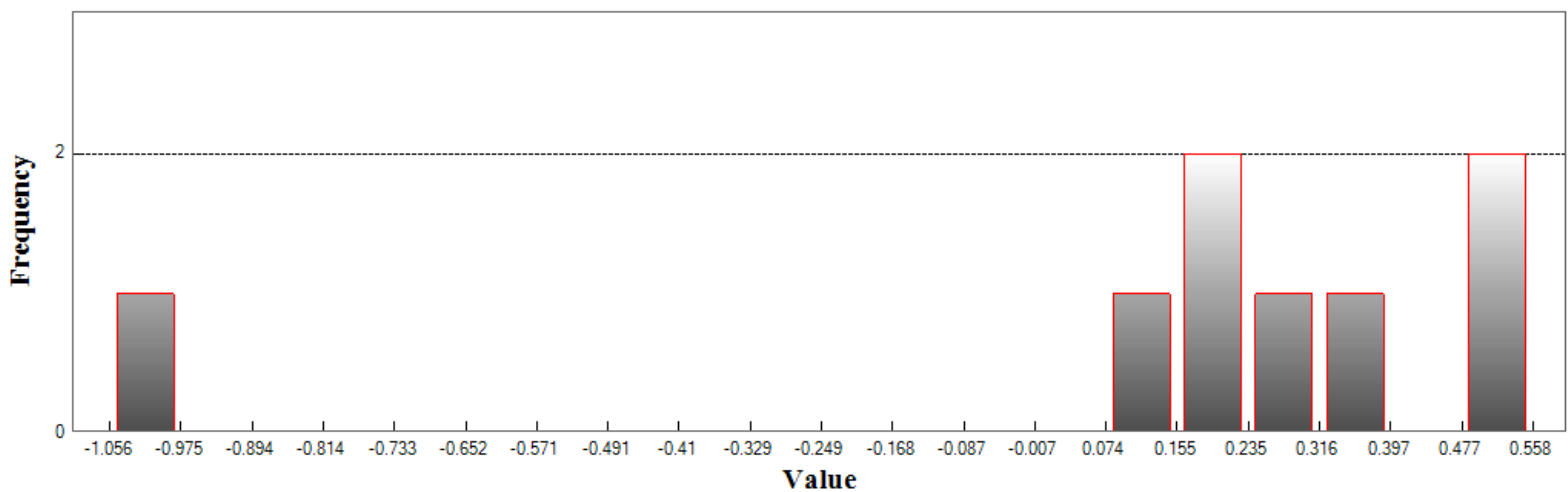


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -1.055  
Maximum DZ: 0.559  
Mean DZ: 0.143  
Mean Magnitude DZ: 0.638  
Number Observations: 8  
Standard Deviation DZ: 0.513  
RMSE Z: 0.501  
95th Percentile: 0.881  
Units: US Survey Feet

## Histogram



Min: -1.055

Max: 0.559

Number Of Bins: 20

Bin Interval: 0.081

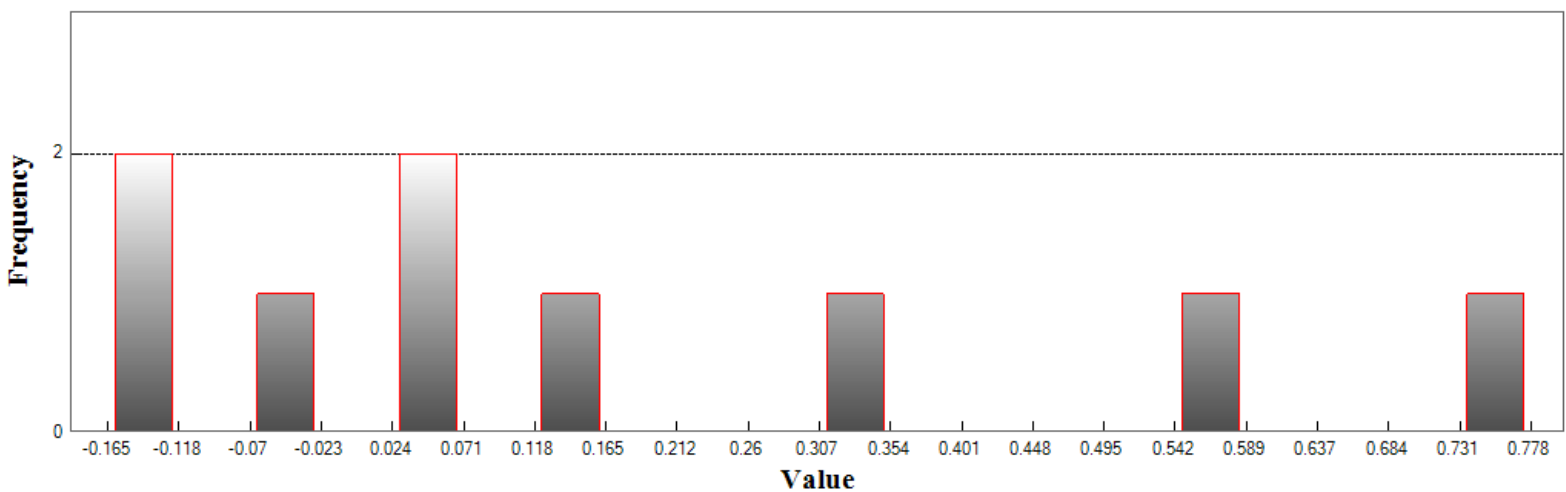


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.165  
Maximum DZ: 0.778  
Mean DZ: 0.17  
Mean Magnitude DZ: 0.493  
Number Observations: 9  
Standard Deviation DZ: 0.318  
RMSE Z: 0.344  
95th Percentile: 0.686  
Units: US Survey Feet

## Histogram



Min: -0.165

Max: 0.778

Number Of Bins: 20

Bin Interval: 0.047

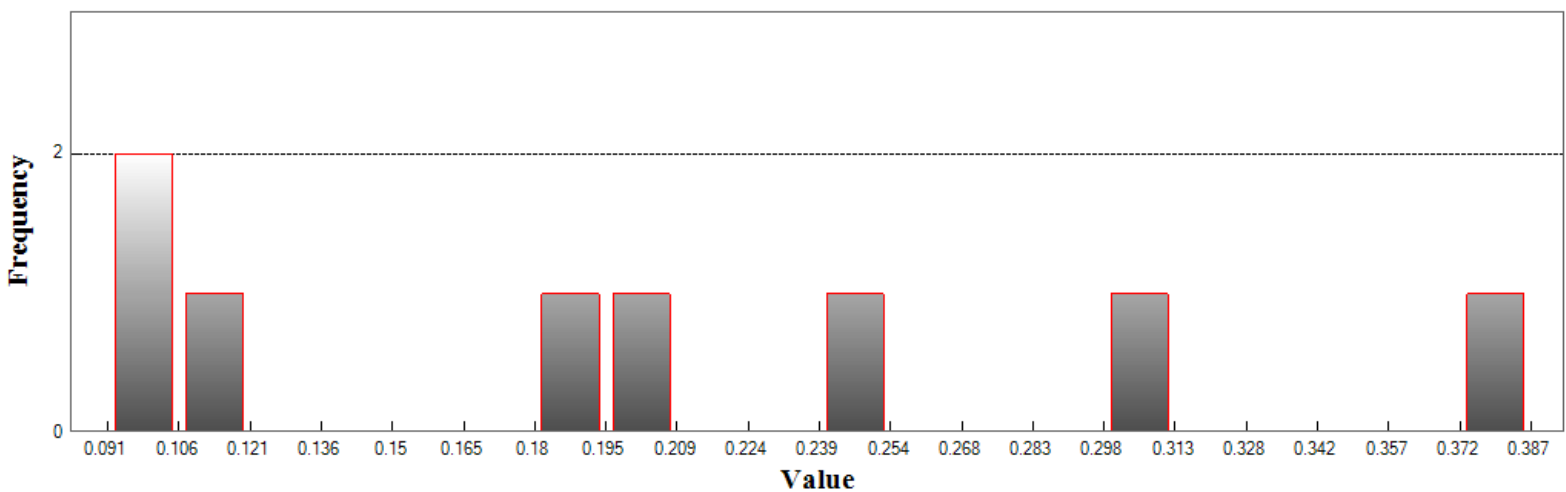


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: 0.092  
Maximum DZ: 0.387  
Mean DZ: 0.206  
Mean Magnitude DZ: 0.453  
Number Observations: 8  
Standard Deviation DZ: 0.106  
RMSE Z: 0.228  
95th Percentile: 0.36  
Units: US Survey Feet

## Histogram



Min: 0.092

Max: 0.387

Number Of Bins: 20

Bin Interval: 0.015



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2H, 2L, 2M

Minimum DZ: -1.055

Maximum DZ: 0.778

Mean DZ: 0.173

Mean Magnitude DZ: 0.532

Number Observations: 25

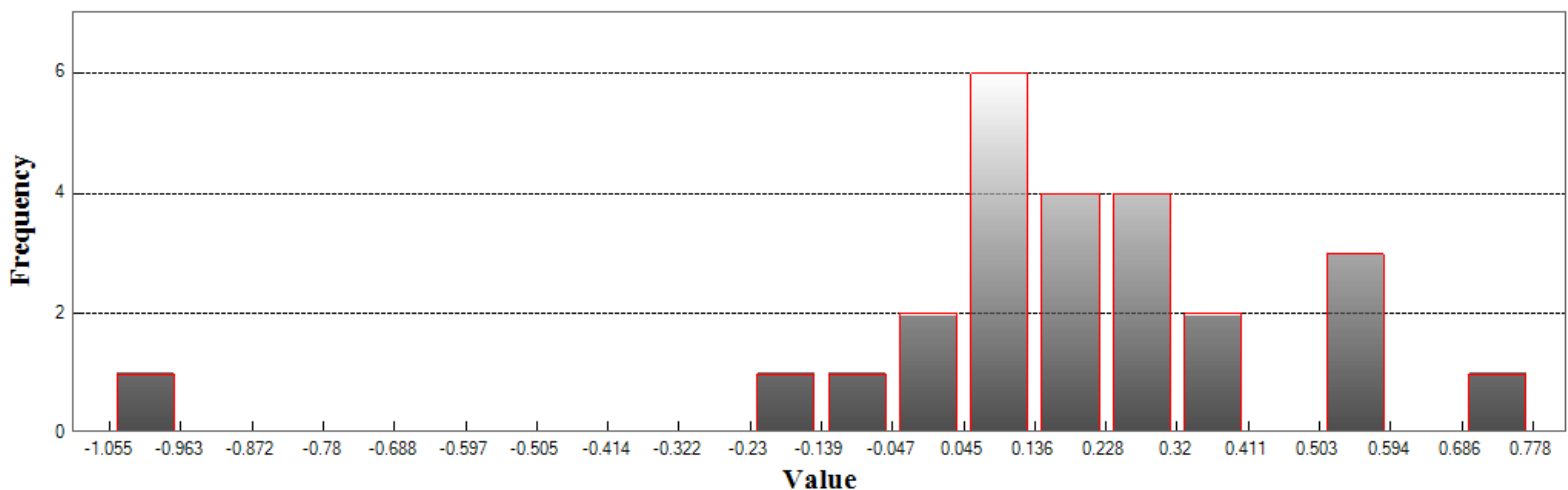
Standard Deviation DZ: 0.338

RMSE Z: 0.374

95th Percentile: 0.734

Units: US Survey Feet

## Histogram



Min: -1.055

Max: 0.778

Number Of Bins: 20

Bin Interval: 0.092



**NORTH CAROLINA GEODETIC SURVEY**

Claude T Bowers Building  
4105 Reedy Creek Road  
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---

## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/23/2015 Finish: 3/23/2015

---

## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute:

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute:

LAS:

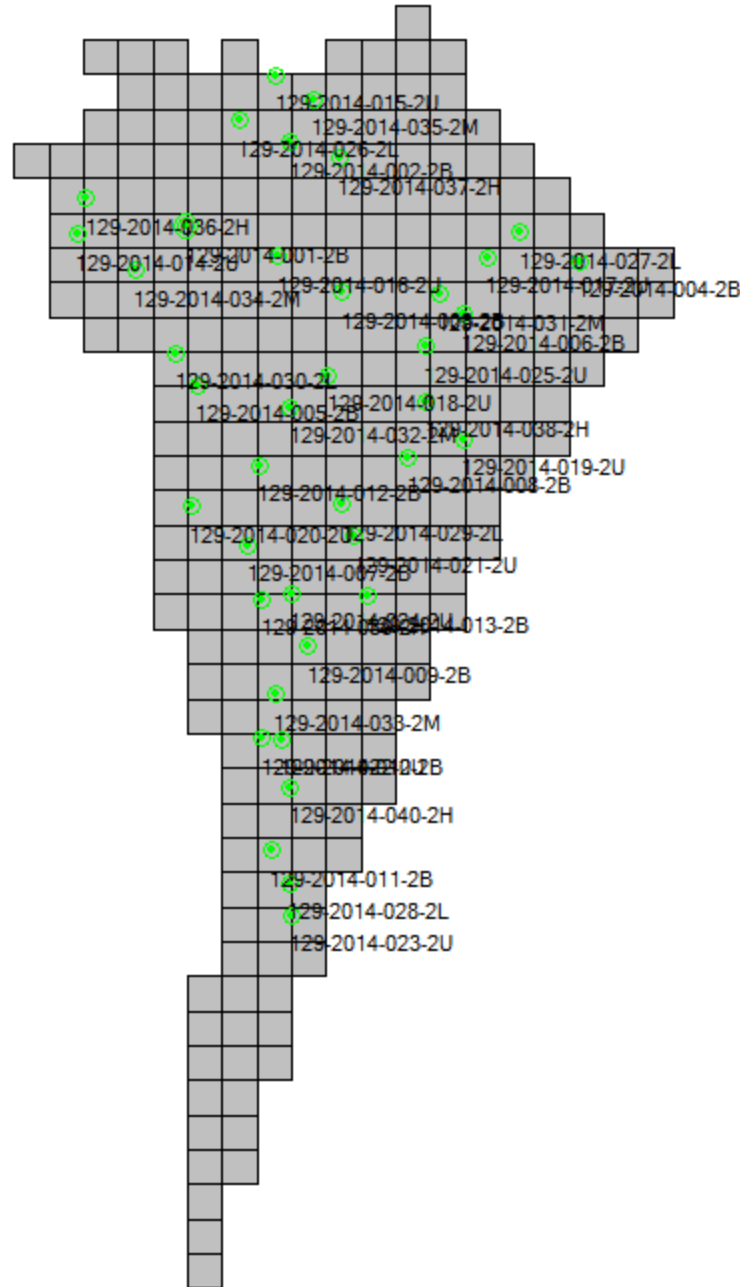
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\NewHanoverCoNC\Masspoints

Number of Data Files Matching Attribute:



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	40			
2B	13	0.474	0.426	
2U	12	0.406	0.409	
2L	5		0.538	0.538
2M	5		0.179	0.179
2H	5		0.505	0.505
Total	40			

Units: US Survey Feet



# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.326

Maximum DZ: 0.576

Mean DZ: 0

Mean Magnitude DZ: 0.425

Number Observations: 25

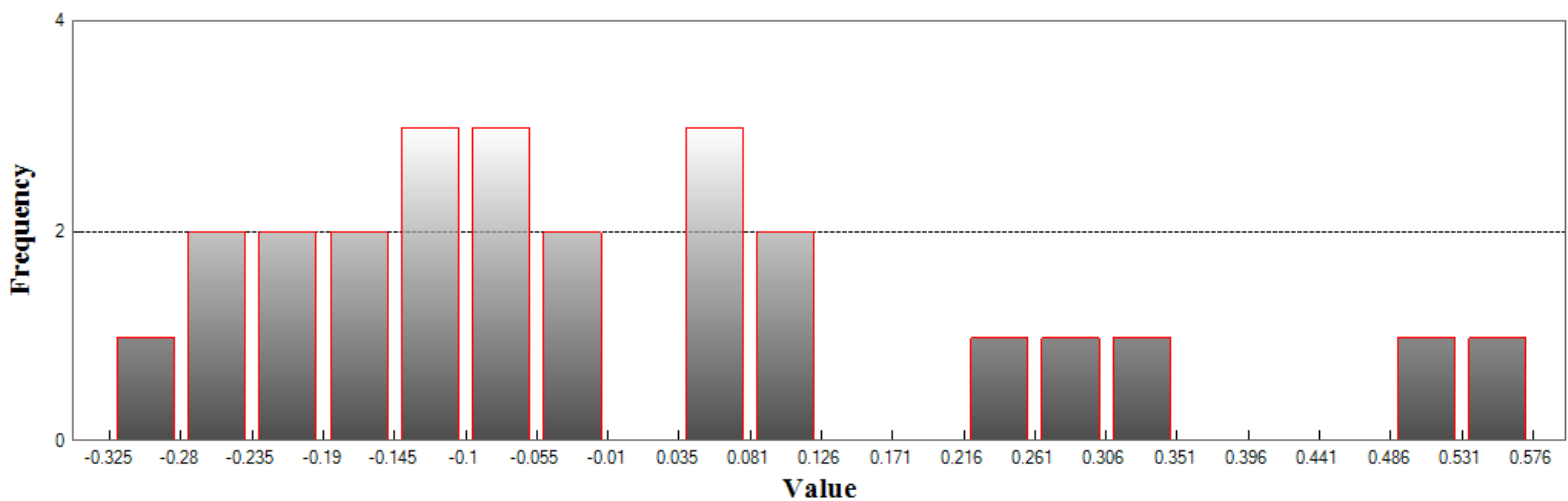
Standard Deviation DZ: 0.23

RMSE Z: 0.226

95% Confidence Level Z: 0.442

Units: US Survey Feet

# Histogram



Min: -0.326

Max: 0.576

Number Of Bins: 20

Bin Interval: 0.045

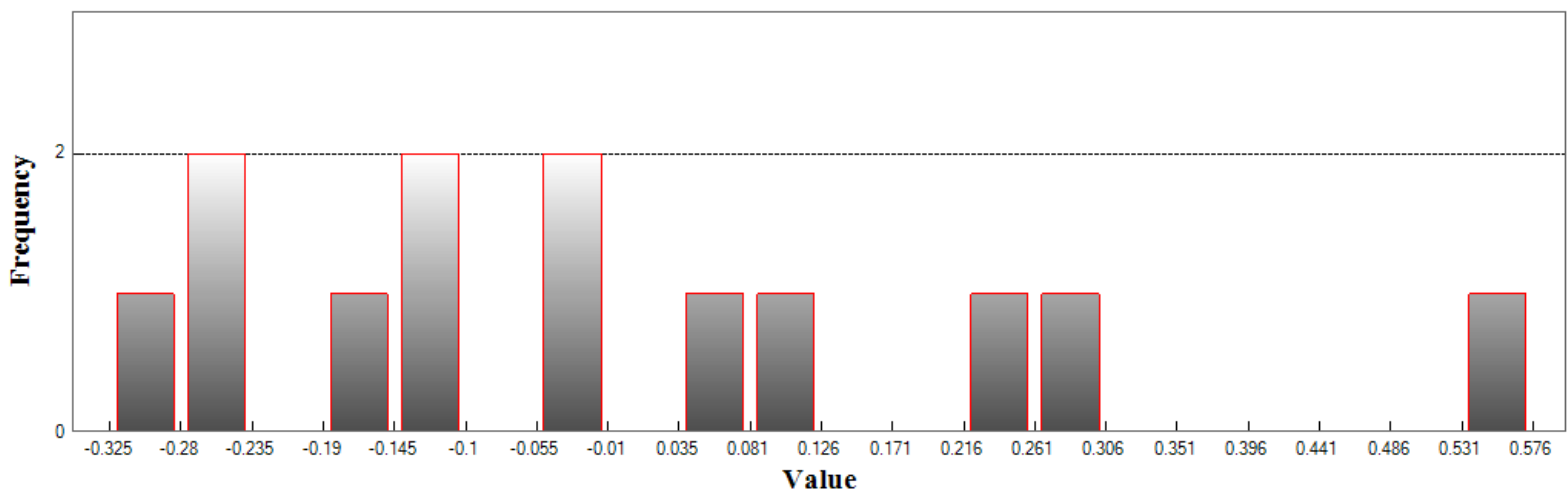


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.326  
Maximum DZ: 0.576  
Mean DZ: -0.007  
Mean Magnitude DZ: 0.441  
Number Observations: 13  
Standard Deviation DZ: 0.251  
RMSE Z: 0.242  
95th Percentile: 0.426  
Units: US Survey Feet

## Histogram



Min: -0.326

Max: 0.576

Number Of Bins: 20

Bin Interval: 0.045

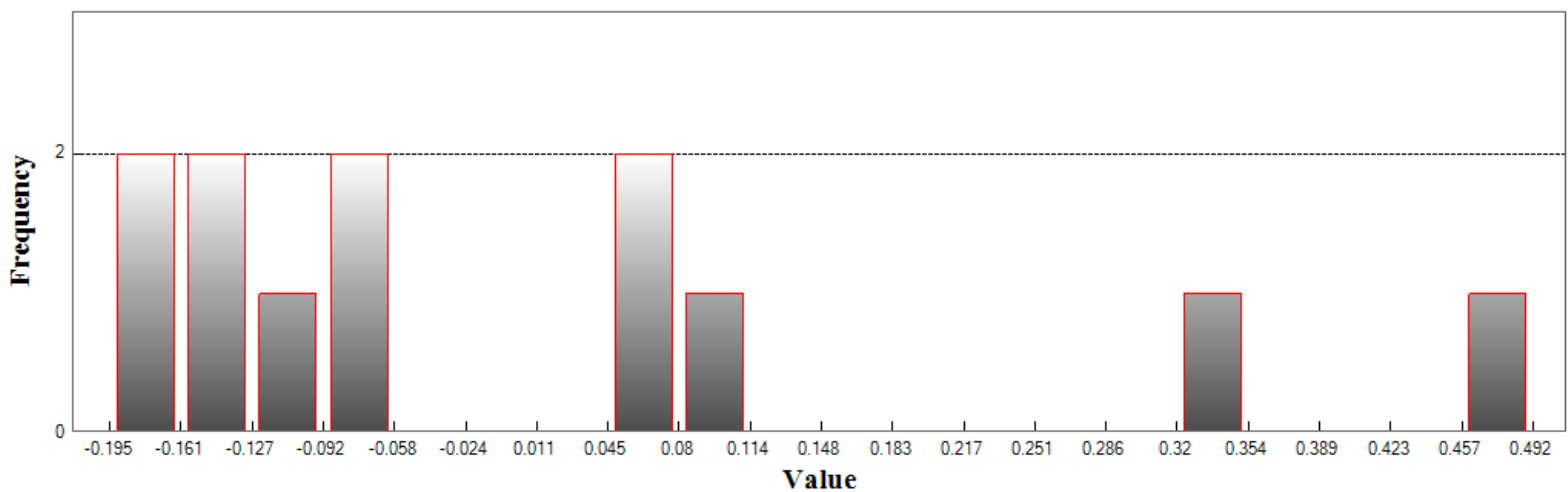


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.195  
Maximum DZ: 0.492  
Mean DZ: 0.007  
Mean Magnitude DZ: 0.407  
Number Observations: 12  
Standard Deviation DZ: 0.216  
RMSE Z: 0.207  
95th Percentile: 0.409  
Units: US Survey Feet

## Histogram



Min: -0.195

Max: 0.492

Number Of Bins: 20

Bin Interval: 0.034

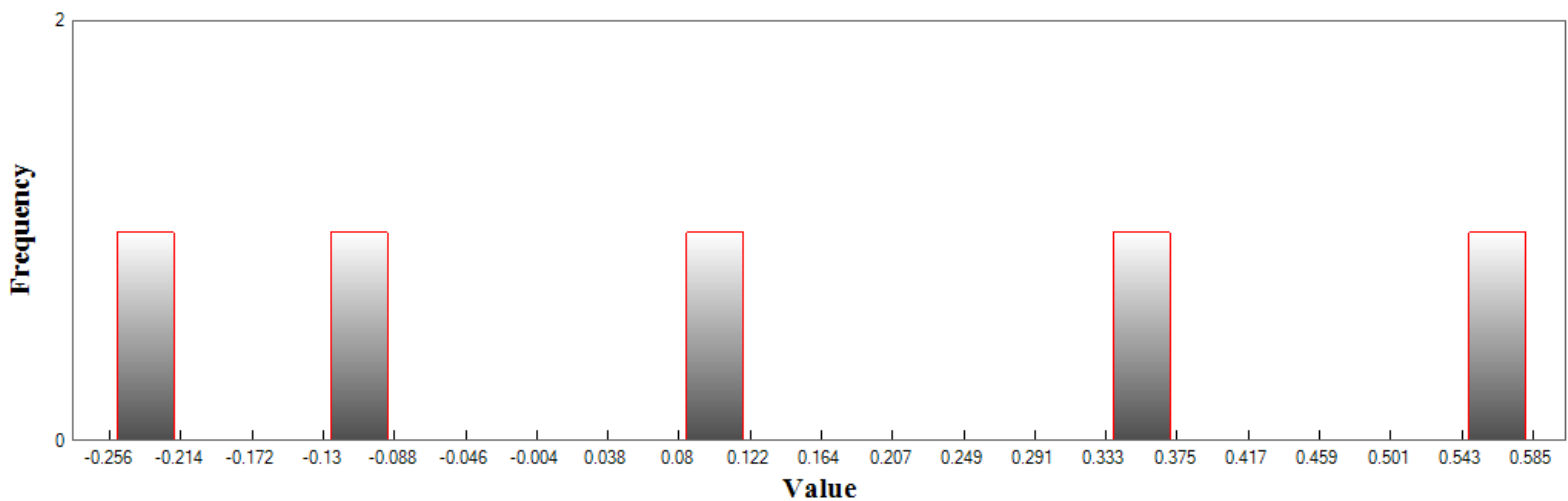


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.256  
Maximum DZ: 0.585  
Mean DZ: 0.139  
Mean Magnitude DZ: 0.532  
Number Observations: 5  
Standard Deviation DZ: 0.339  
RMSE Z: 0.333  
95th Percentile: 0.538  
Units: US Survey Feet

## Histogram



Min: -0.256

Max: 0.585

Number Of Bins: 20

Bin Interval: 0.042

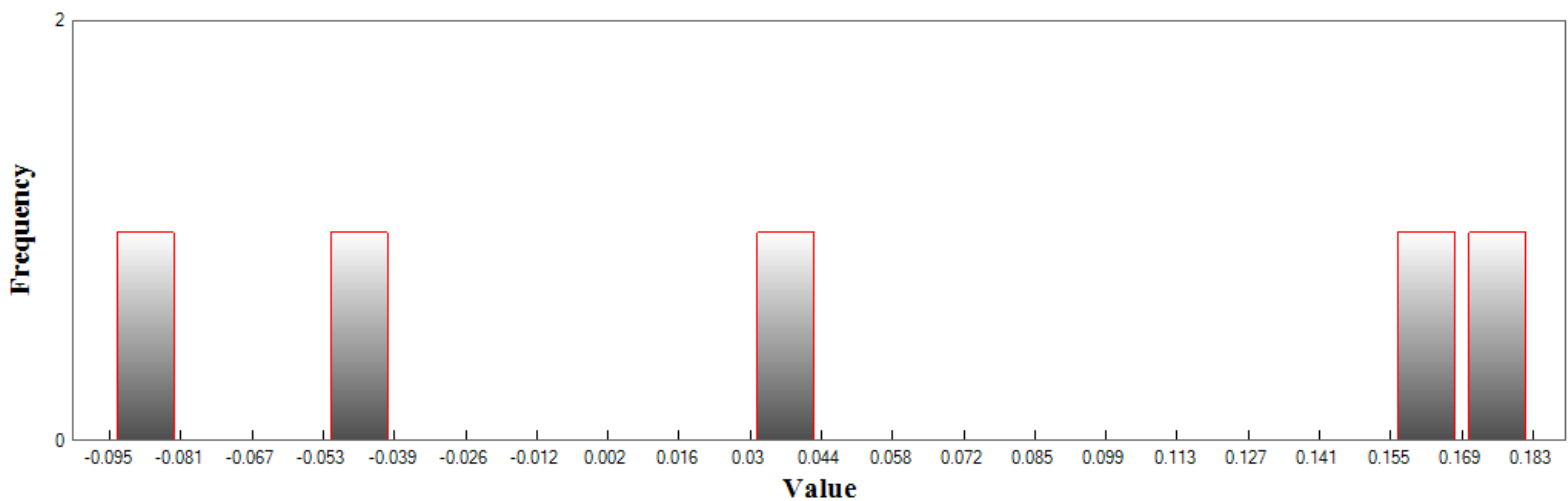


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.095  
Maximum DZ: 0.183  
Mean DZ: 0.048  
Mean Magnitude DZ: 0.323  
Number Observations: 5  
Standard Deviation DZ: 0.124  
RMSE Z: 0.121  
95th Percentile: 0.179  
Units: US Survey Feet

## Histogram



Min: -0.095

Max: 0.183

Number Of Bins: 20

Bin Interval: 0.014



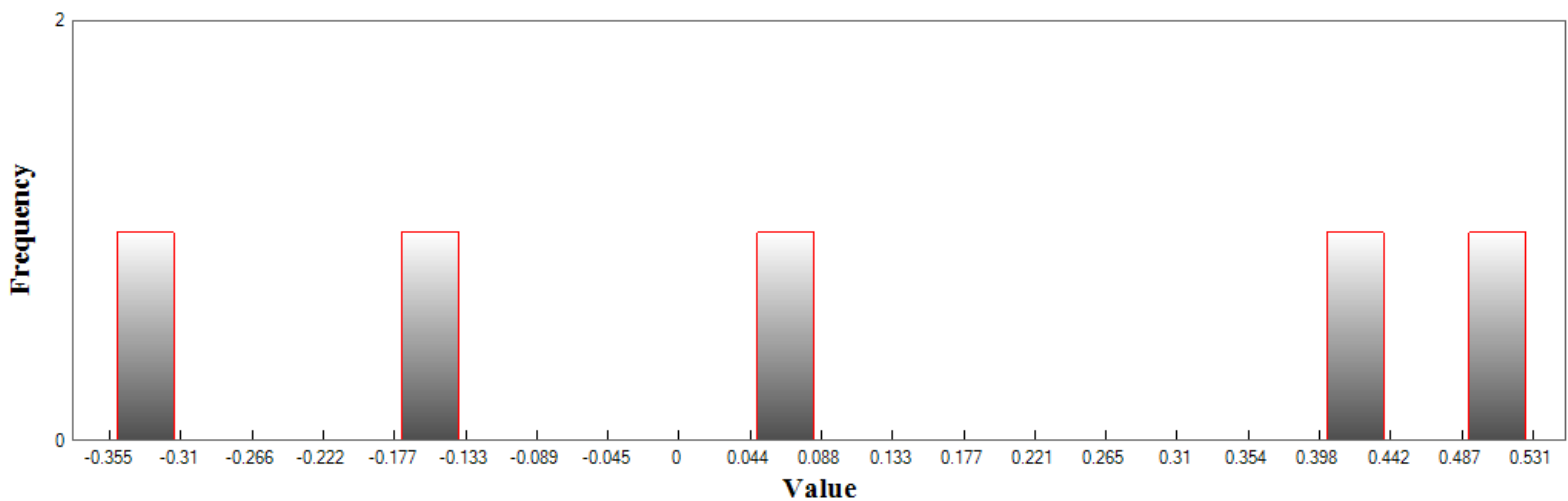


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.354  
Maximum DZ: 0.531  
Mean DZ: 0.099  
Mean Magnitude DZ: 0.551  
Number Observations: 5  
Standard Deviation DZ: 0.37  
RMSE Z: 0.346  
95th Percentile: 0.505  
Units: US Survey Feet

## Histogram



Min: -0.354

Max: 0.531

Number Of Bins: 20

Bin Interval: 0.044



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2M, 2H

Minimum DZ: -0.354

Maximum DZ: 0.585

Mean DZ: 0.096

Mean Magnitude DZ: 0.48

Number Observations: 15

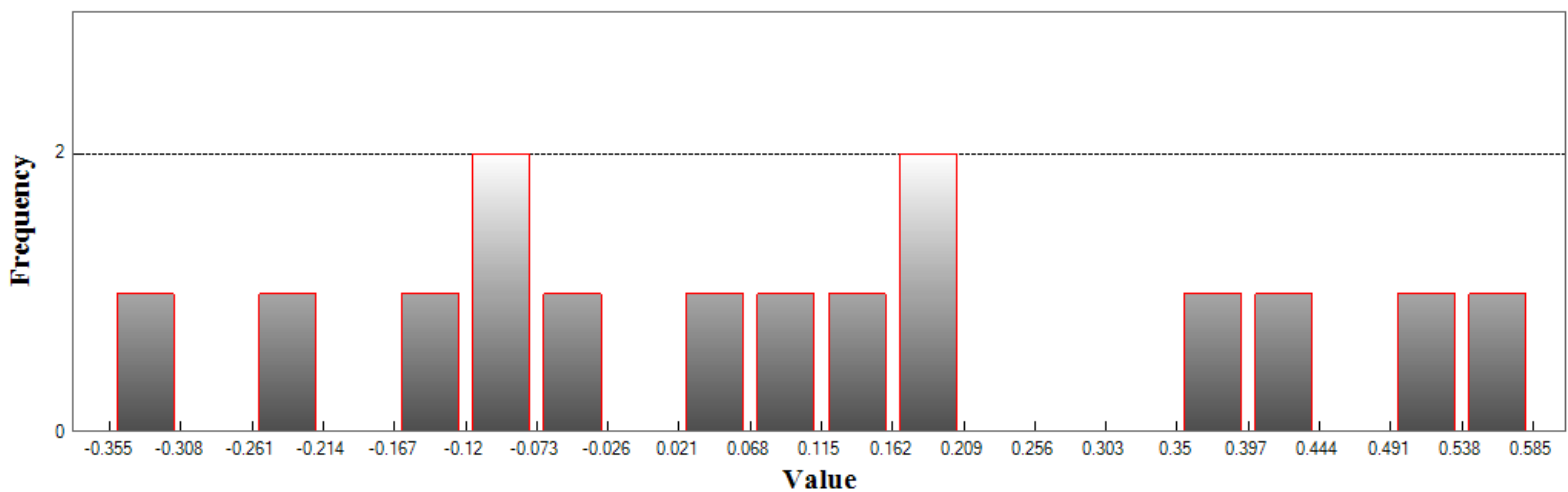
Standard Deviation DZ: 0.279

RMSE Z: 0.286

95th Percentile: 0.547

Units: US Survey Feet

## Histogram



Min: -0.354

Max: 0.585

Number Of Bins: 20

Bin Interval: 0.047

**NORTH CAROLINA GEODETIC SURVEY**

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



---

## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/23/2015 Finish: 3/23/2015

---

## Metadata Information

### Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

### Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### LAS:

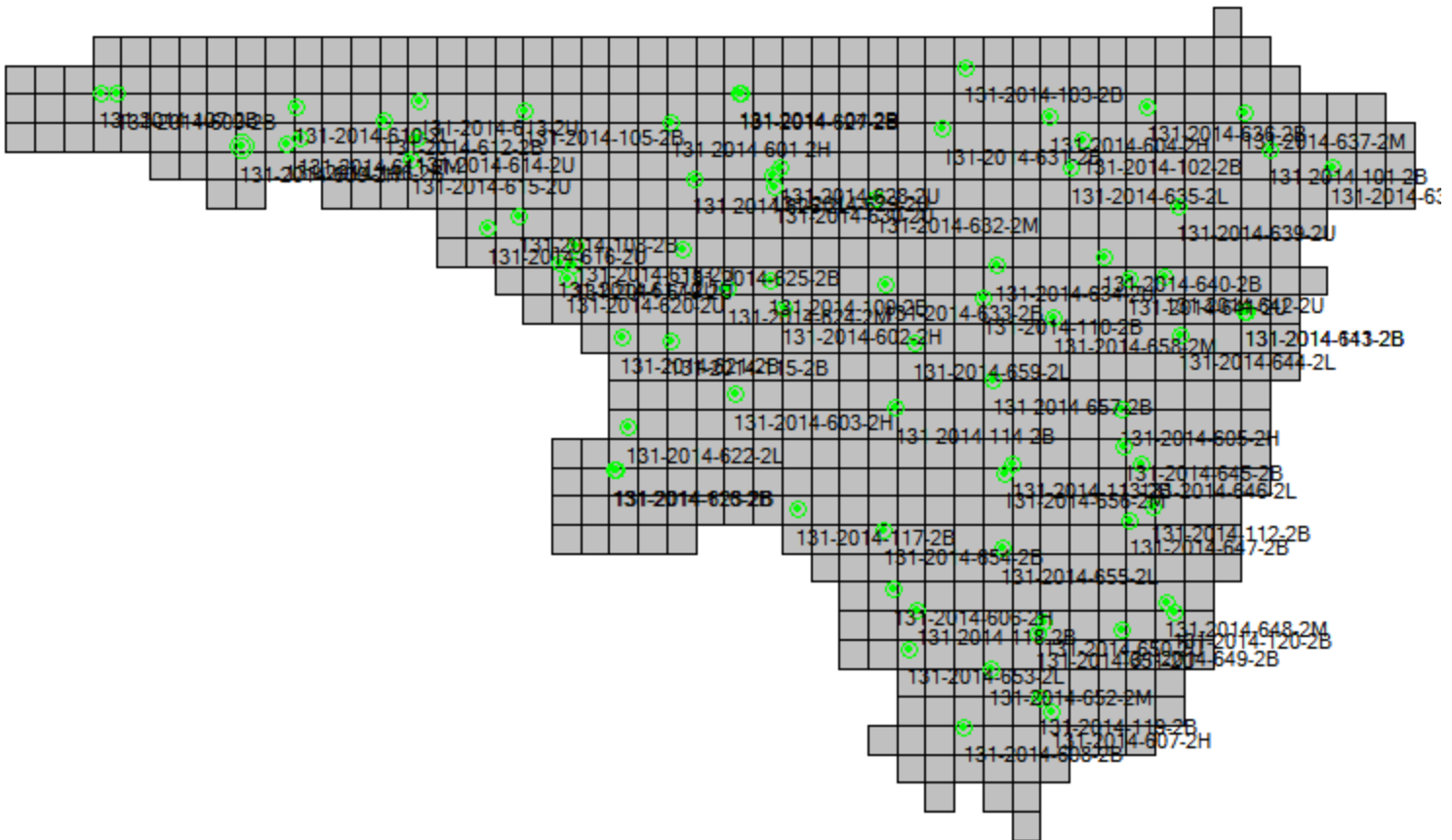
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\NorthamptonCoNC\Masspoints

Number of Data Files Matching Attribute: 669 out of 669



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	78			
2H	6		0.441	0.441
2B	38	0.364	0.329	
2L	9		0.385	0.385
2M	8		0.596	0.596
2U	17	0.378	0.326	
Total	78			

Units: US Survey Feet

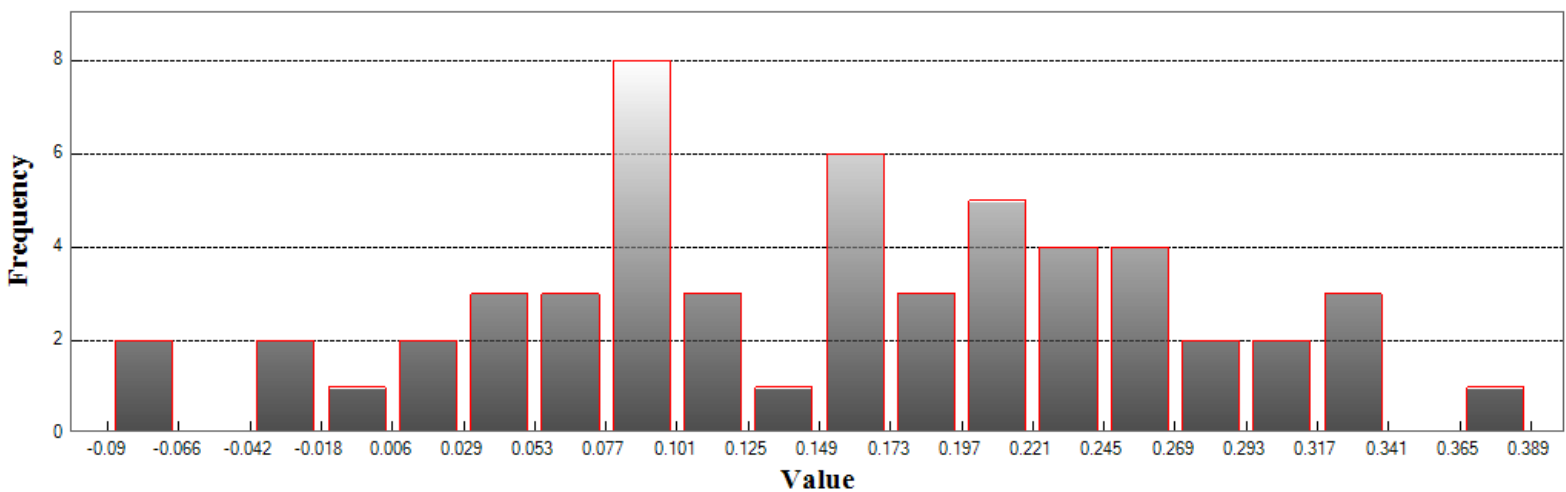


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2B, 2U  
Minimum DZ: -0.09  
Maximum DZ: 0.389  
Mean DZ: 0.153  
Mean Magnitude DZ: 0.401  
Number Observations: 55  
Standard Deviation DZ: 0.11  
RMSE Z: 0.188  
95% Confidence Level Z: 0.368  
Units: US Survey Feet

# Histogram



Min: -0.09  
Max: 0.389  
Number Of Bins: 20  
Bin Interval: 0.024

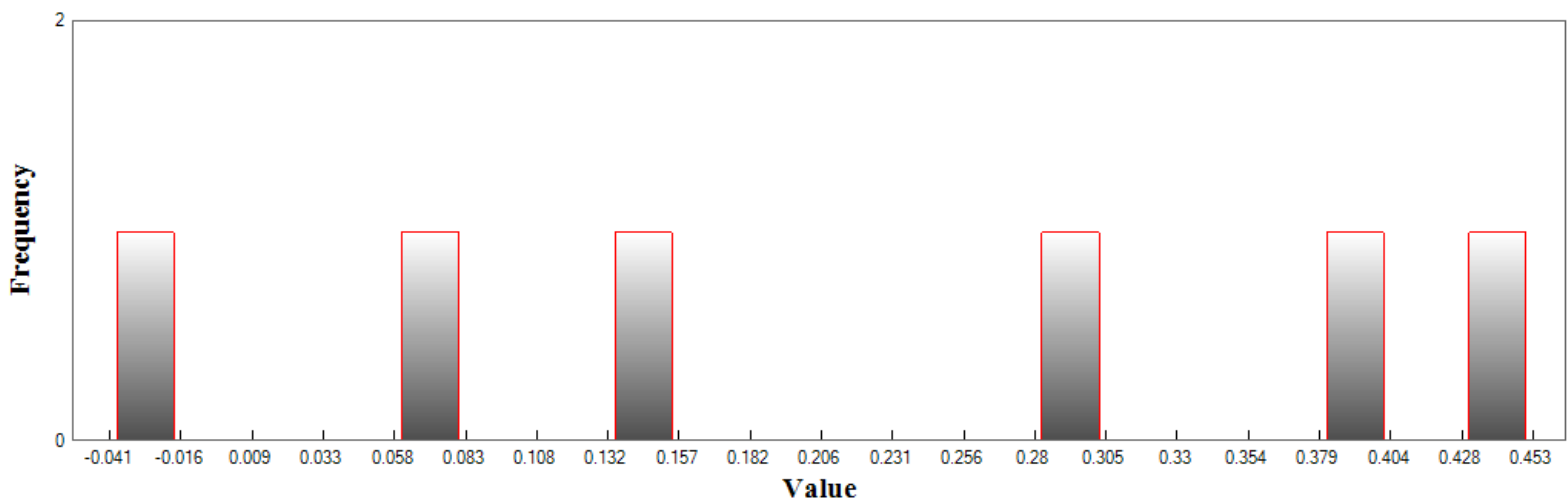


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.04  
Maximum DZ: 0.453  
Mean DZ: 0.225  
Mean Magnitude DZ: 0.488  
Number Observations: 6  
Standard Deviation DZ: 0.194  
RMSE Z: 0.286  
95th Percentile: 0.441  
Units: US Survey Feet

## Histogram



Min: -0.04

Max: 0.453

Number Of Bins: 20

Bin Interval: 0.025

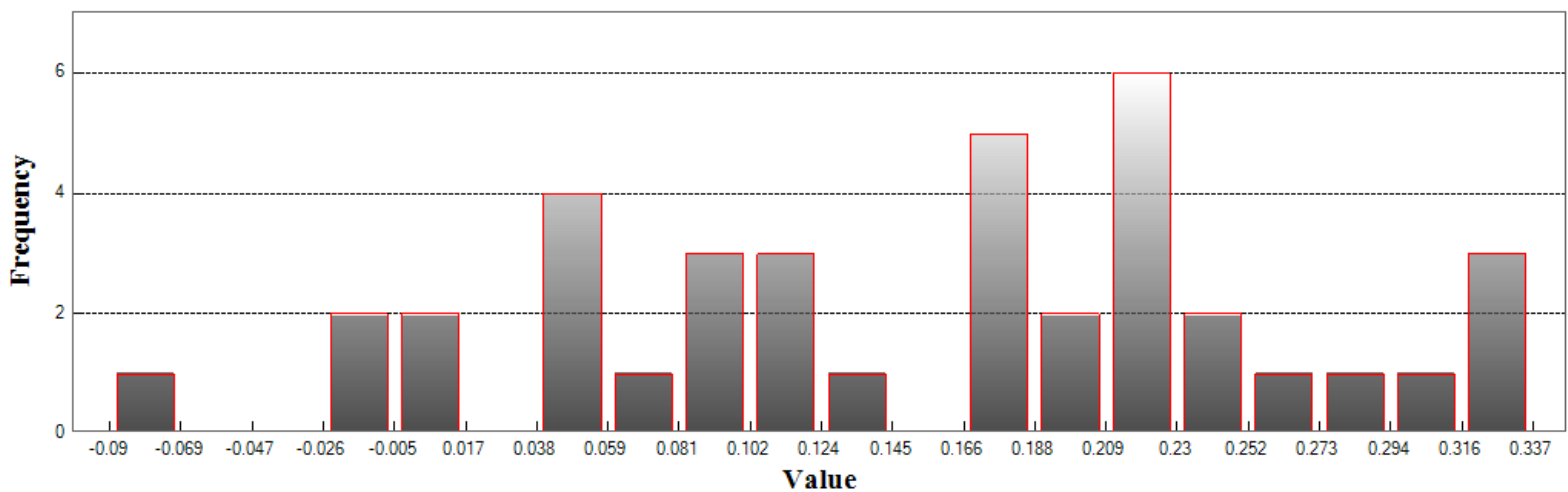


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.09  
Maximum DZ: 0.337  
Mean DZ: 0.153  
Mean Magnitude DZ: 0.399  
Number Observations: 38  
Standard Deviation DZ: 0.107  
RMSE Z: 0.186  
95th Percentile: 0.329  
Units: US Survey Feet

## Histogram



Min: -0.09

Max: 0.337

Number Of Bins: 20

Bin Interval: 0.021



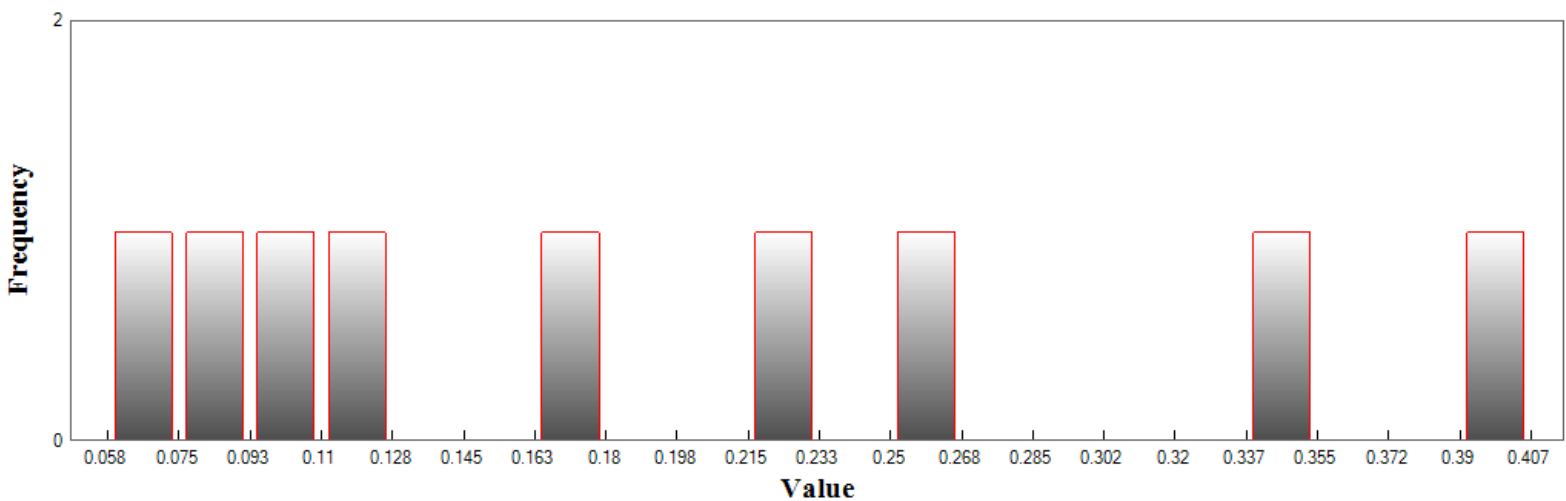


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: 0.057  
Maximum DZ: 0.407  
Mean DZ: 0.197  
Mean Magnitude DZ: 0.444  
Number Observations: 9  
Standard Deviation DZ: 0.122  
RMSE Z: 0.228  
95th Percentile: 0.385  
Units: US Survey Feet

## Histogram



Min: 0.057

Max: 0.407

Number Of Bins: 20

Bin Interval: 0.017

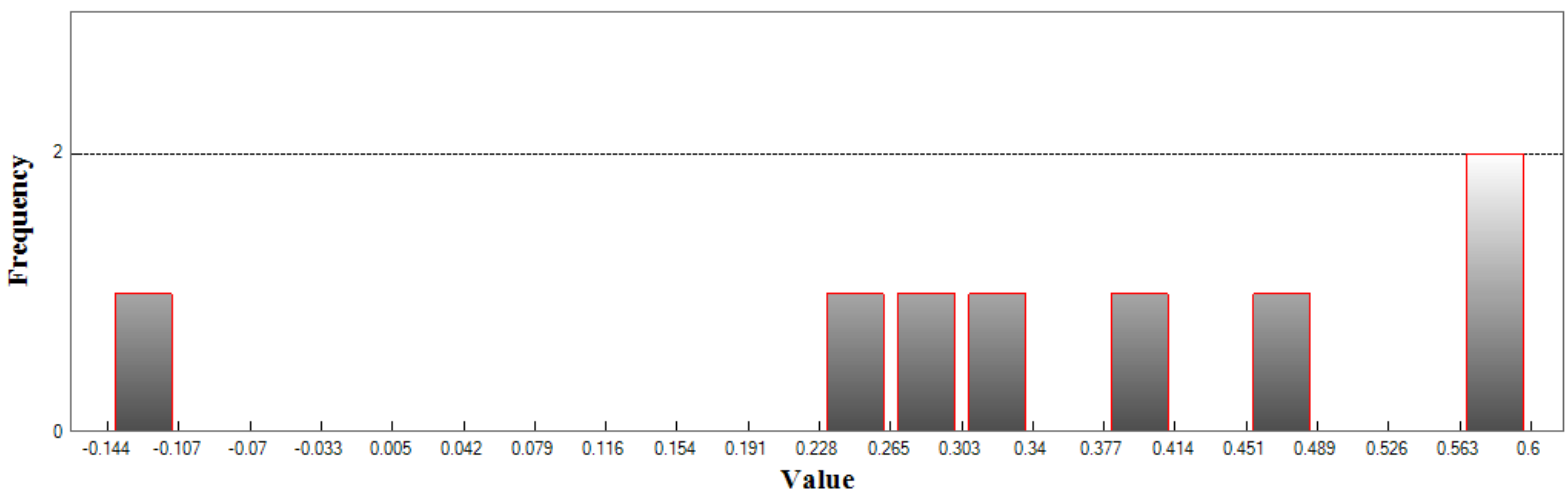


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.145  
Maximum DZ: 0.6  
Mean DZ: 0.341  
Mean Magnitude DZ: 0.614  
Number Observations: 8  
Standard Deviation DZ: 0.24  
RMSE Z: 0.408  
95th Percentile: 0.596  
Units: US Survey Feet

## Histogram



Min: -0.145

Max: 0.6

Number Of Bins: 20

Bin Interval: 0.037

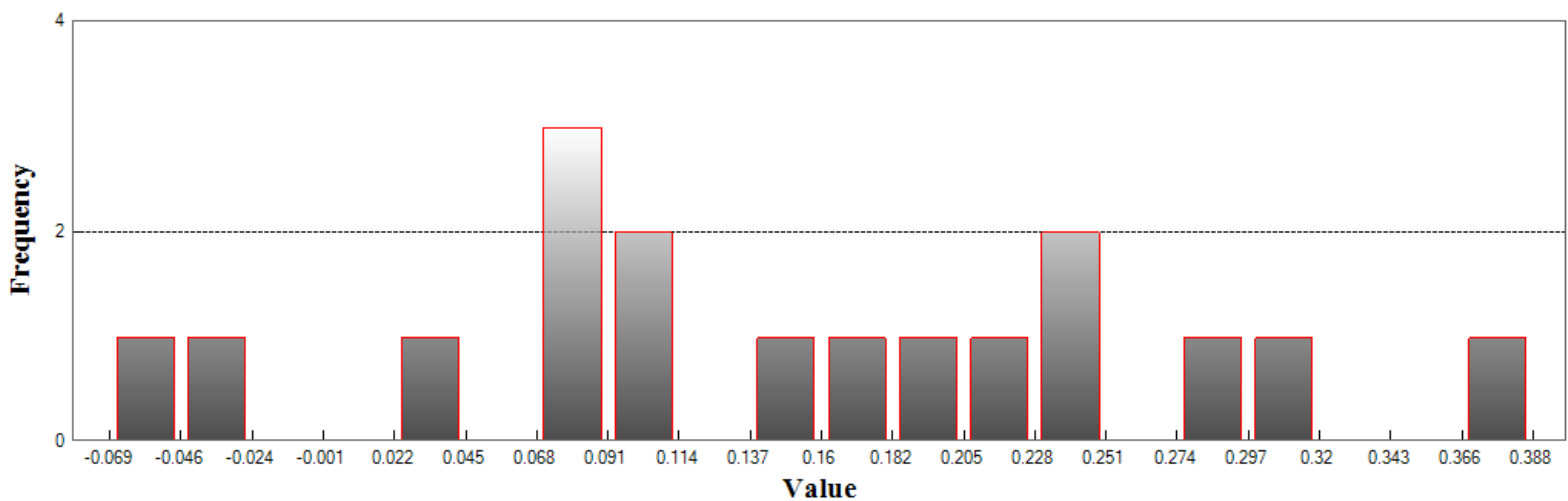


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.069  
Maximum DZ: 0.389  
Mean DZ: 0.153  
Mean Magnitude DZ: 0.406  
Number Observations: 17  
Standard Deviation DZ: 0.122  
RMSE Z: 0.193  
95th Percentile: 0.326  
Units: US Survey Feet

## Histogram



Min: -0.069

Max: 0.389

Number Of Bins: 20

Bin Interval: 0.023



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2H, 2L, 2M

Minimum DZ: -0.145

Maximum DZ: 0.6

Mean DZ: 0.254

Mean Magnitude DZ: 0.52

Number Observations: 23

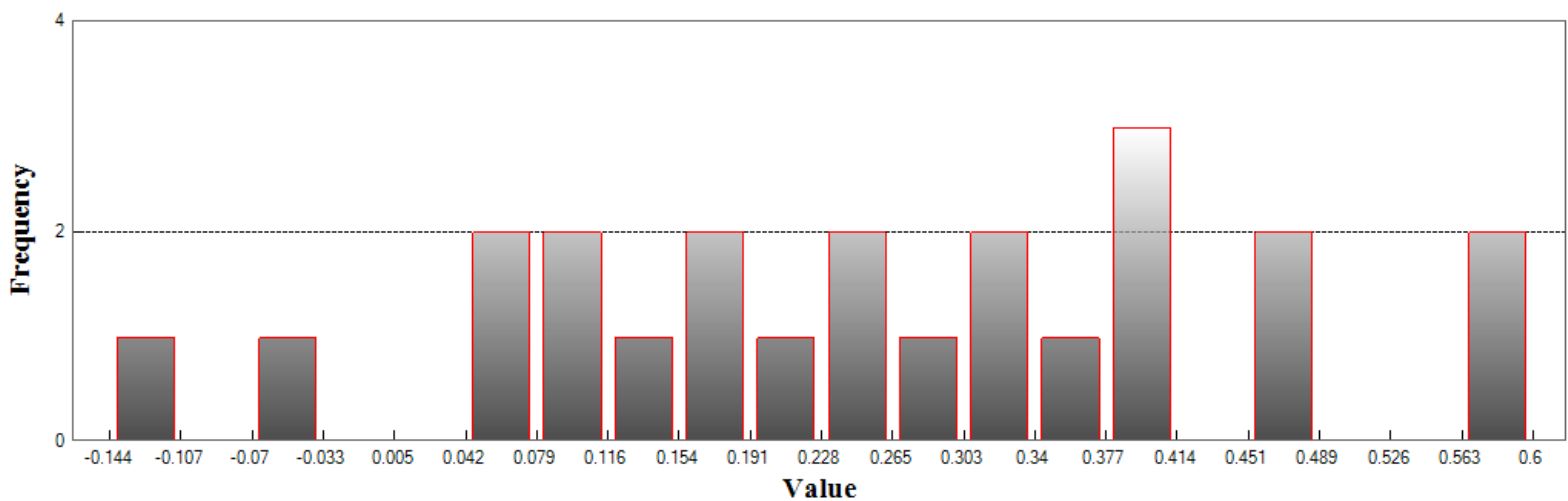
Standard Deviation DZ: 0.191

RMSE Z: 0.316

95th Percentile: 0.578

Units: US Survey Feet

## Histogram



Min: -0.145

Max: 0.6

Number Of Bins: 20

Bin Interval: 0.037



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## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/23/2015 Finish: 3/23/2015

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## Metadata Information

Tile Index:  
Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR  
Number of Polys: 0

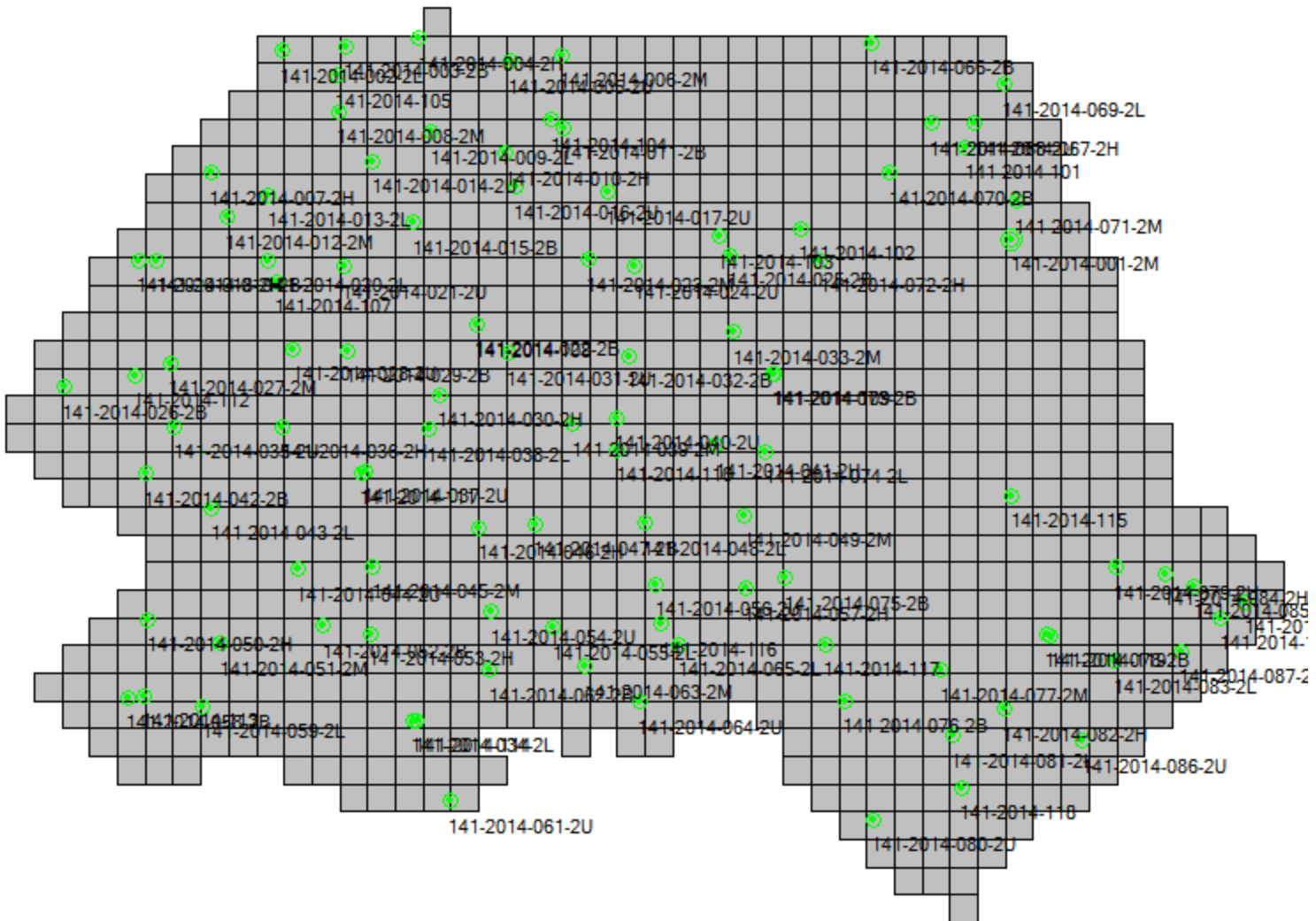
Intensity:  
Tile Index Attribute: Not Specified  
Path to Data: Not Specified  
Number of Data Files Matching Attribute:

DEM:  
Tile Index Attribute: Not Specified  
Path to Data: Not Specified  
Number of Data Files Matching Attribute:

LAS:  
Tile Index Attribute: LiDARTiles  
Path to Data: \\NCEMJFHQCLPSHP\FData\PenderCoNC\Masspoints  
Number of Data Files Matching Attribute:



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	106			
2M	15		0.436	0.436
2L	15		0.548	0.548
2B	40	0.379	0.353	
2H	15		0.342	0.342
2U	21	0.310	0.257	
Total	106			

Units: US Survey Feet

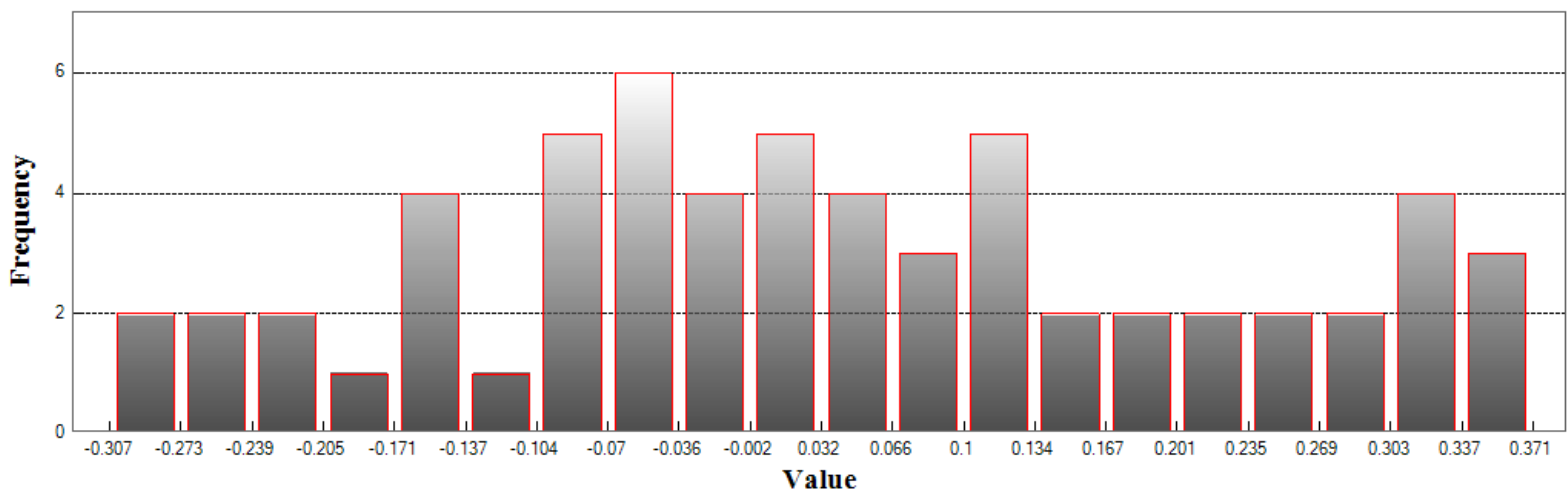


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2B, 2U  
Minimum DZ: -0.307  
Maximum DZ: 0.371  
Mean DZ: 0.04  
Mean Magnitude DZ: 0.383  
Number Observations: 61  
Standard Deviation DZ: 0.179  
RMSE Z: 0.182  
95% Confidence Level Z: 0.357  
Units: US Survey Feet

# Histogram



Min: -0.307  
Max: 0.371  
Number Of Bins: 20  
Bin Interval: 0.034



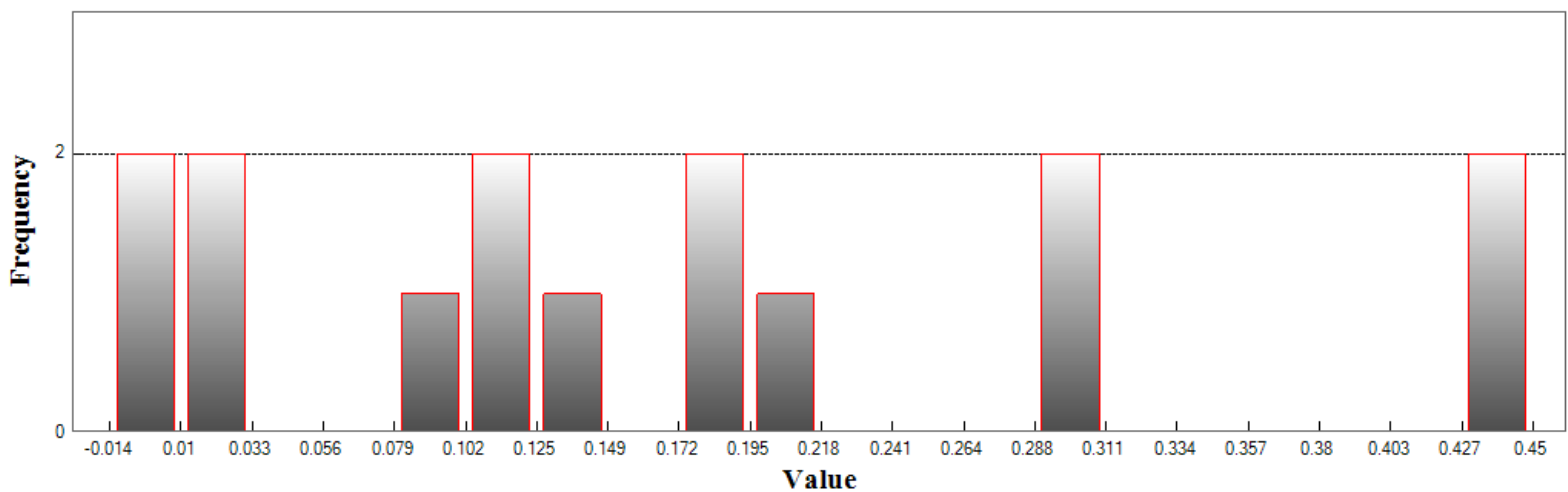


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.014  
Maximum DZ: 0.449  
Mean DZ: 0.168  
Mean Magnitude DZ: 0.413  
Number Observations: 15  
Standard Deviation DZ: 0.146  
RMSE Z: 0.22  
95th Percentile: 0.436  
Units: US Survey Feet

## Histogram



Min: -0.014

Max: 0.449

Number Of Bins: 20

Bin Interval: 0.023

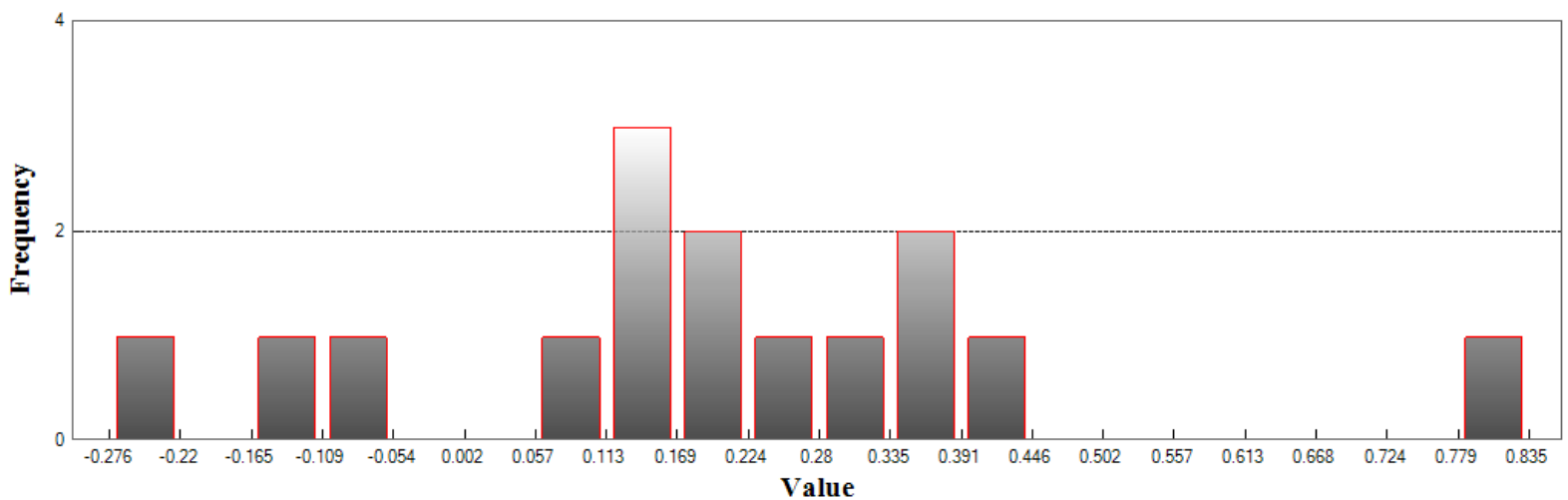


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.276  
Maximum DZ: 0.835  
Mean DZ: 0.196  
Mean Magnitude DZ: 0.513  
Number Observations: 15  
Standard Deviation DZ: 0.26  
RMSE Z: 0.319  
95th Percentile: 0.548  
Units: US Survey Feet

## Histogram



Min: -0.276  
Max: 0.835  
Number Of Bins: 20  
Bin Interval: 0.056

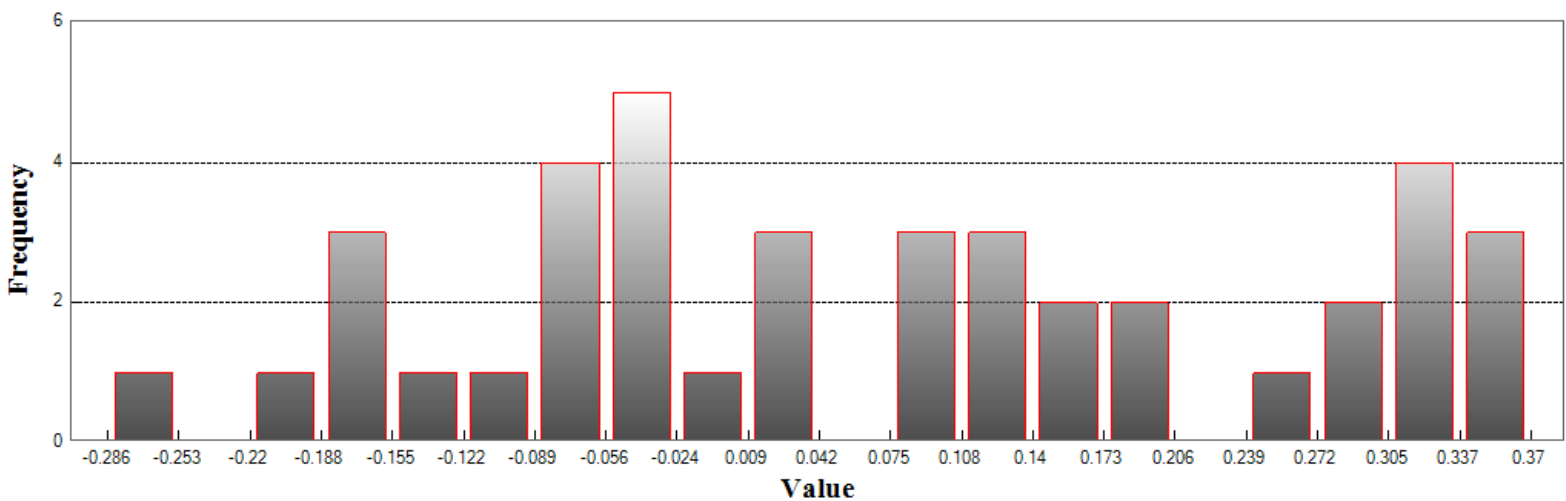


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.286  
Maximum DZ: 0.371  
Mean DZ: 0.072  
Mean Magnitude DZ: 0.397  
Number Observations: 40  
Standard Deviation DZ: 0.182  
RMSE Z: 0.193  
95th Percentile: 0.353  
Units: US Survey Feet

## Histogram



Min: -0.286

Max: 0.371

Number Of Bins: 20

Bin Interval: 0.033

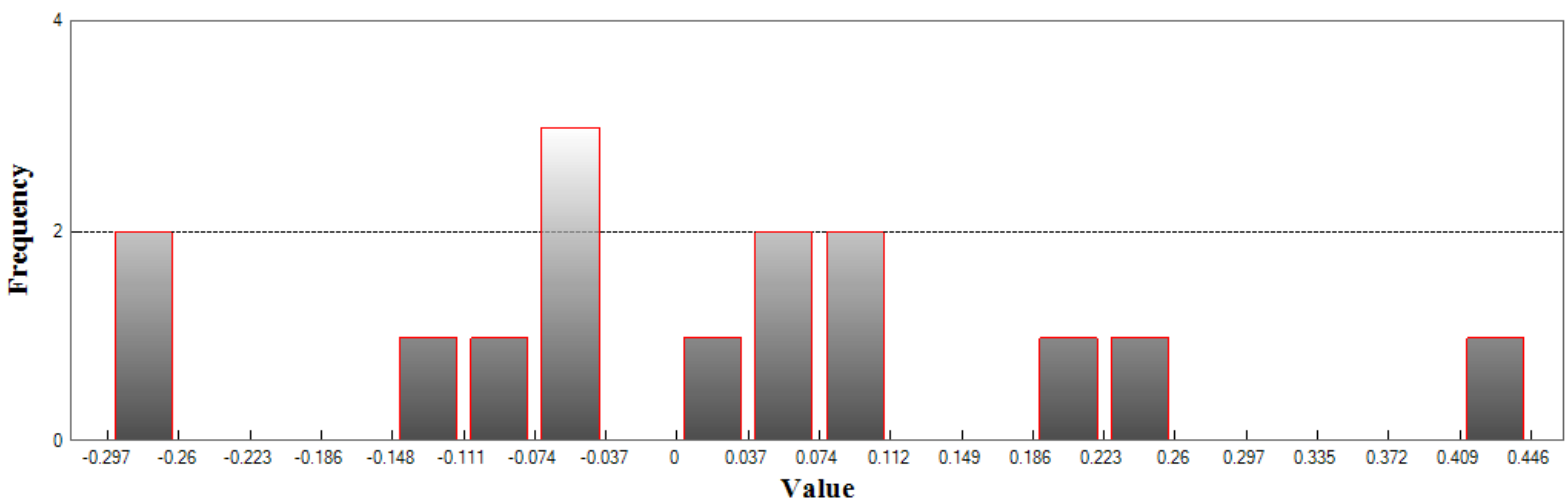


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.297  
Maximum DZ: 0.446  
Mean DZ: 0.015  
Mean Magnitude DZ: 0.388  
Number Observations: 15  
Standard Deviation DZ: 0.198  
RMSE Z: 0.192  
95th Percentile: 0.342  
Units: US Survey Feet

## Histogram



Min: -0.297

Max: 0.446

Number Of Bins: 20

Bin Interval: 0.037

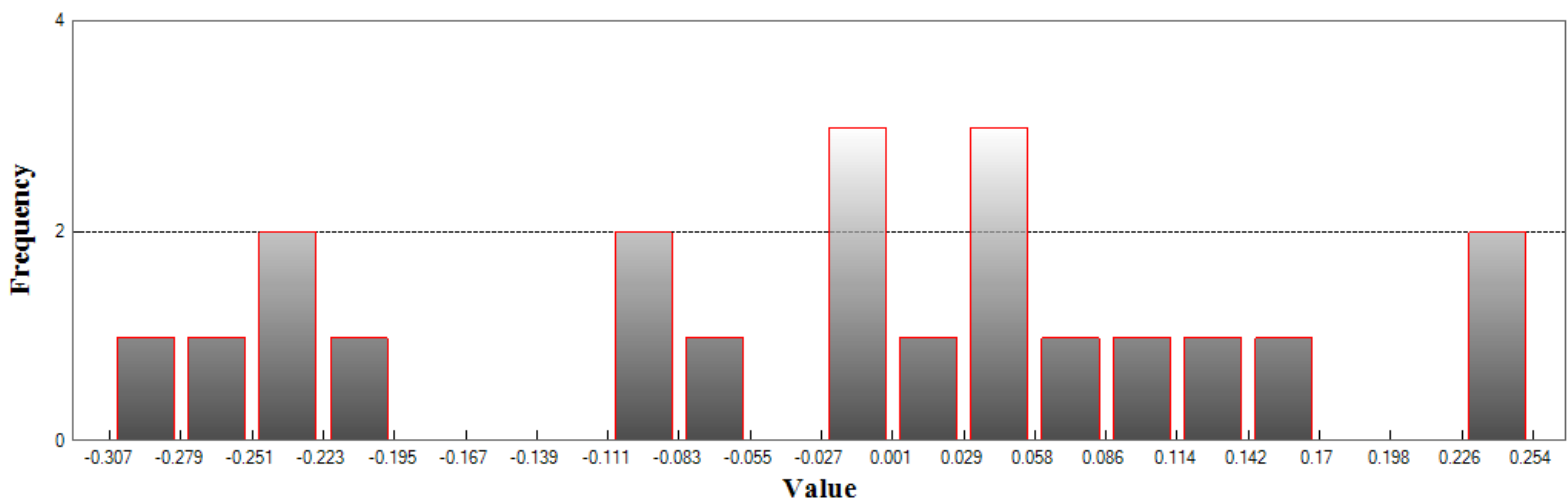


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.307  
Maximum DZ: 0.254  
Mean DZ: -0.021  
Mean Magnitude DZ: 0.355  
Number Observations: 21  
Standard Deviation DZ: 0.16  
RMSE Z: 0.158  
95th Percentile: 0.257  
Units: US Survey Feet

## Histogram



Min: -0.307  
Max: 0.254  
Number Of Bins: 20  
Bin Interval: 0.028



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2M, 2L, 2H

Minimum DZ: -0.297

Maximum DZ: 0.835

Mean DZ: 0.127

Mean Magnitude DZ: 0.441

Number Observations: 45

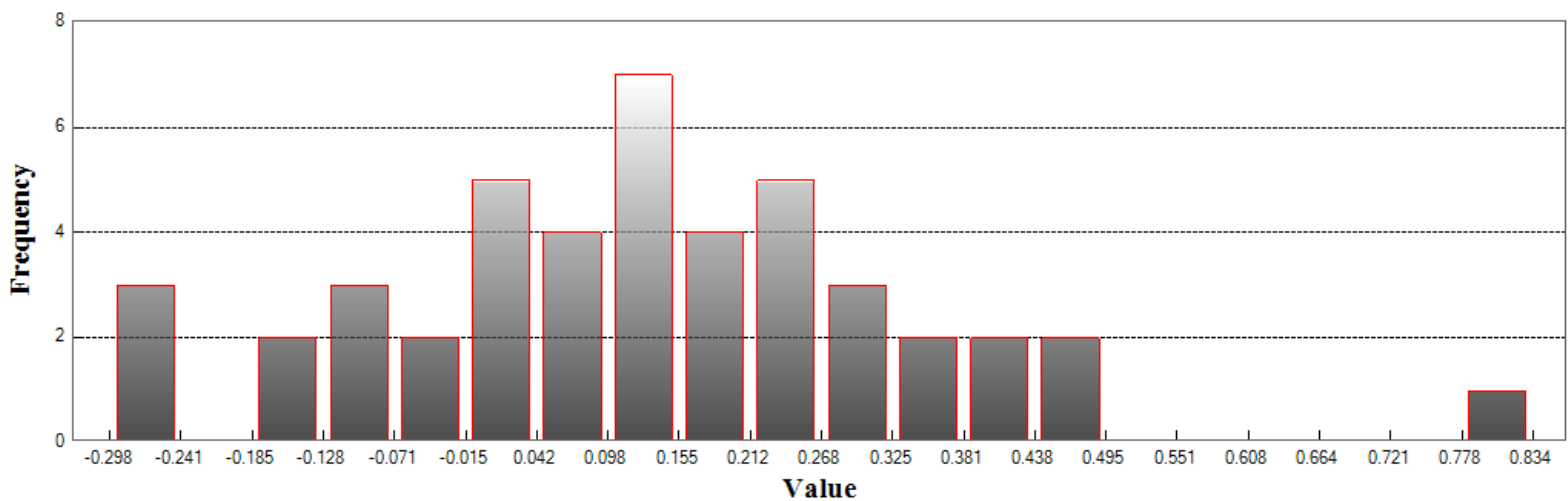
Standard Deviation DZ: 0.217

RMSE Z: 0.25

95th Percentile: 0.443

Units: US Survey Feet

## Histogram



Min: -0.297

Max: 0.835

Number Of Bins: 20

Bin Interval: 0.057

**NORTH CAROLINA GEODETIC SURVEY**

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## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/26/2015 Finish: 3/26/2015

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## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

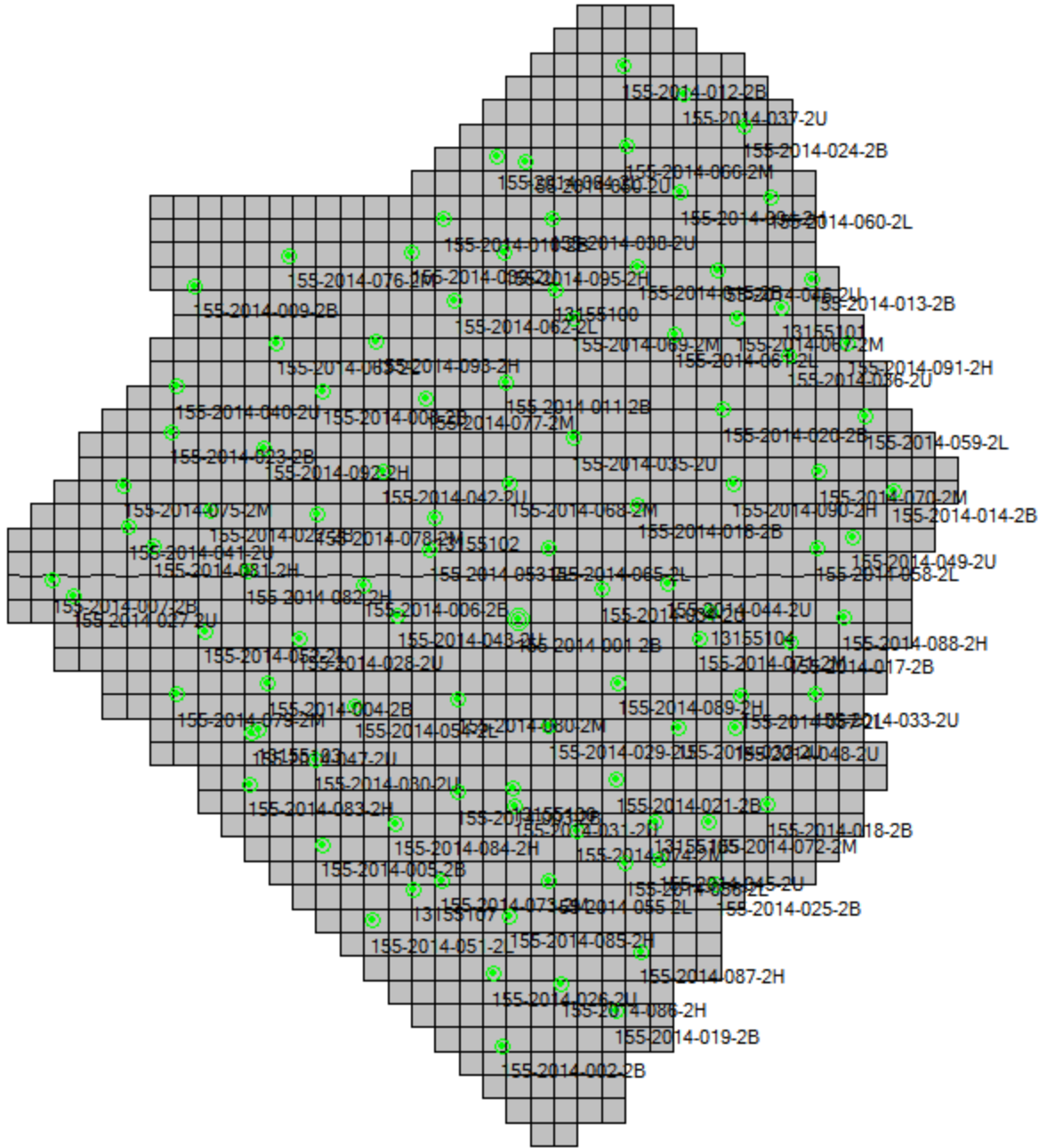
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\RobesonCoNC\Masspoints

Number of Data Files Matching Attribute: 1137 out of 1137



## Tiled-Data Area







LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	103			
2B	33	0.396	0.445	
2U	25	0.426	0.416	
2L	15		0.364	0.364
2M	15		0.400	0.400
2H	15		1.834	1.834
Total	103			

Units: US Survey Feet



# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.504

Maximum DZ: 0.533

Mean DZ: -0.026

Mean Magnitude DZ: 0.408

Number Observations: 58

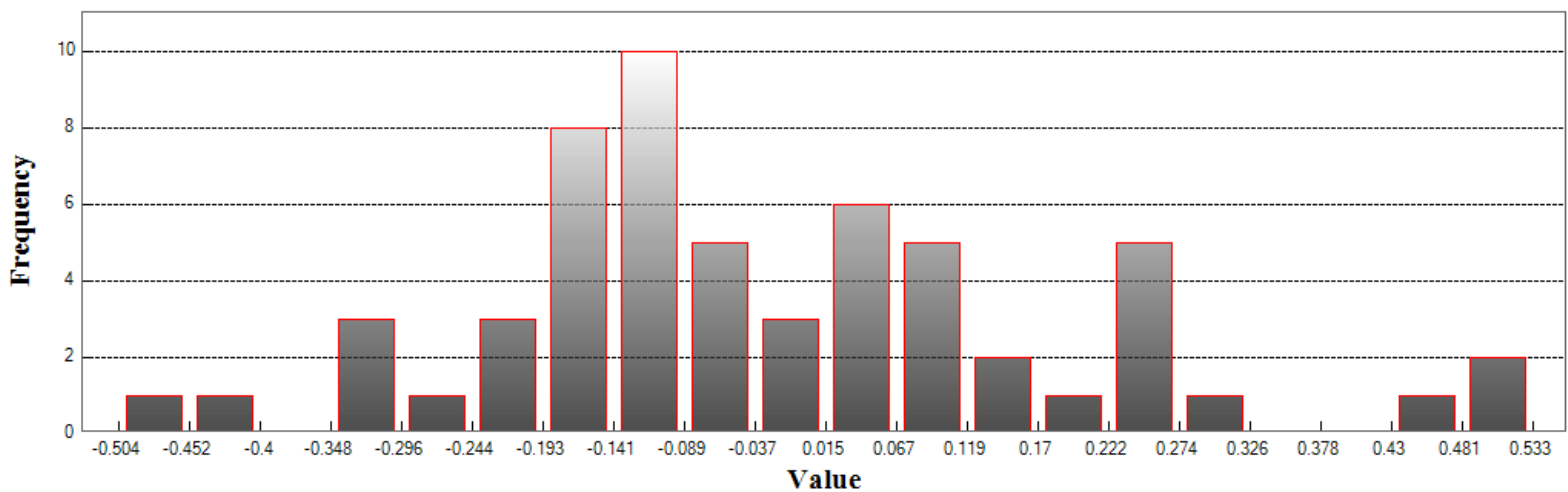
Standard Deviation DZ: 0.209

RMSE Z: 0.209

95% Confidence Level Z: 0.409

Units: US Survey Feet

# Histogram



Min: -0.504

Max: 0.533

Number Of Bins: 20

Bin Interval: 0.052

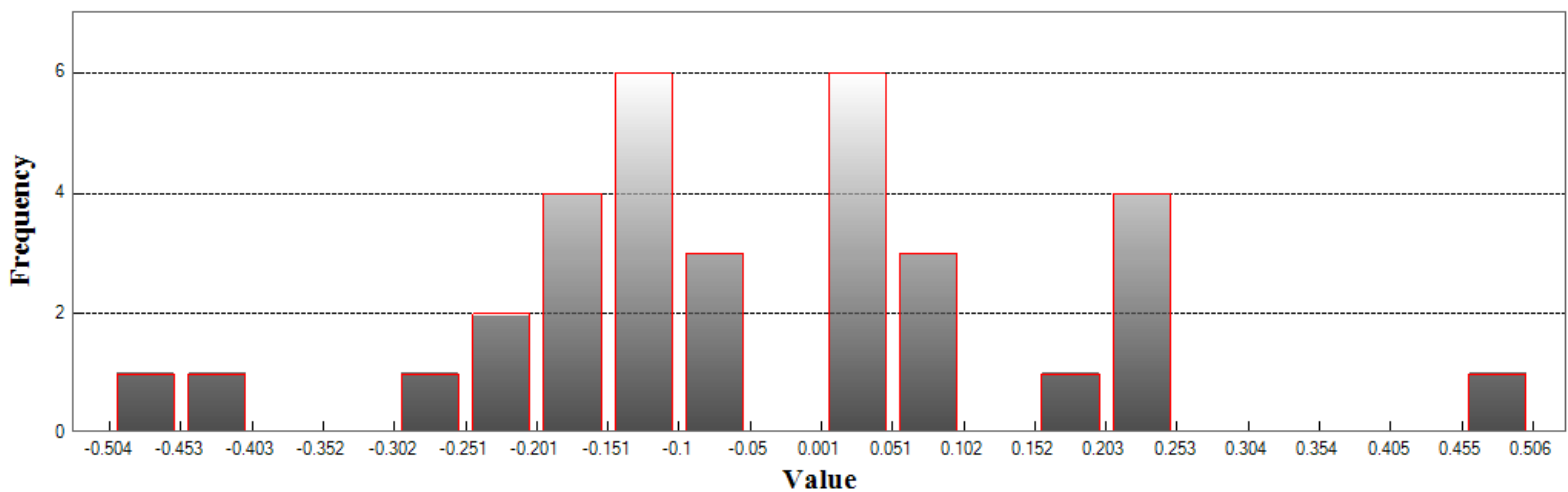


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.504  
Maximum DZ: 0.506  
Mean DZ: -0.037  
Mean Magnitude DZ: 0.399  
Number Observations: 33  
Standard Deviation DZ: 0.202  
RMSE Z: 0.202  
95th Percentile: 0.445  
Units: US Survey Feet

## Histogram



Min: -0.504

Max: 0.506

Number Of Bins: 20

Bin Interval: 0.05

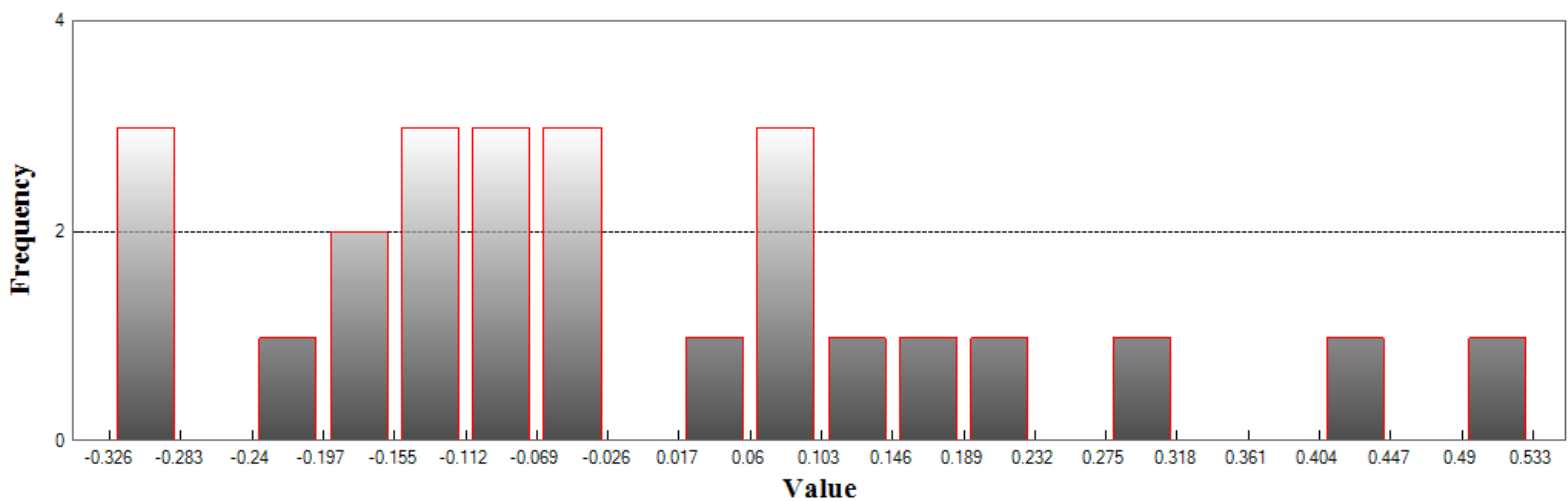


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.326  
Maximum DZ: 0.533  
Mean DZ: -0.011  
Mean Magnitude DZ: 0.42  
Number Observations: 25  
Standard Deviation DZ: 0.221  
RMSE Z: 0.217  
95th Percentile: 0.416  
Units: US Survey Feet

## Histogram



Min: -0.326  
Max: 0.533  
Number Of Bins: 20  
Bin Interval: 0.043

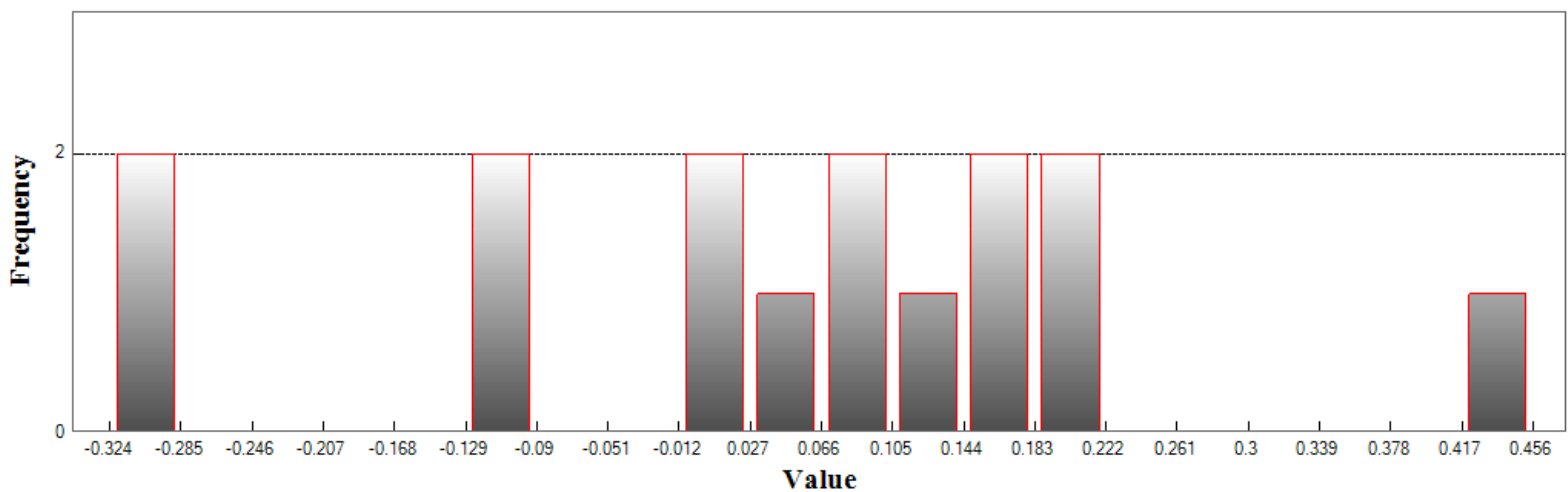


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.325  
Maximum DZ: 0.456  
Mean DZ: 0.044  
Mean Magnitude DZ: 0.397  
Number Observations: 15  
Standard Deviation DZ: 0.199  
RMSE Z: 0.197  
95th Percentile: 0.364  
Units: US Survey Feet

## Histogram



Min: -0.325

Max: 0.456

Number Of Bins: 20

Bin Interval: 0.039

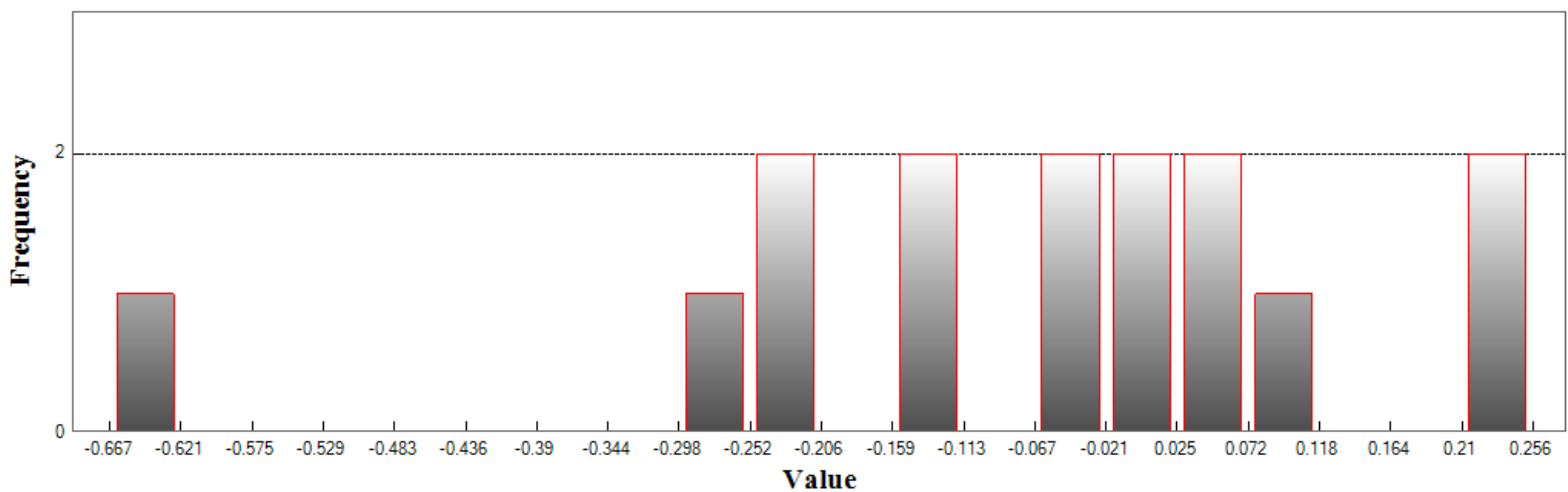


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.667  
Maximum DZ: 0.257  
Mean DZ: -0.07  
Mean Magnitude DZ: 0.406  
Number Observations: 15  
Standard Deviation DZ: 0.228  
RMSE Z: 0.231  
95th Percentile: 0.4  
Units: US Survey Feet

## Histogram



Min: -0.667

Max: 0.257

Number Of Bins: 20

Bin Interval: 0.046

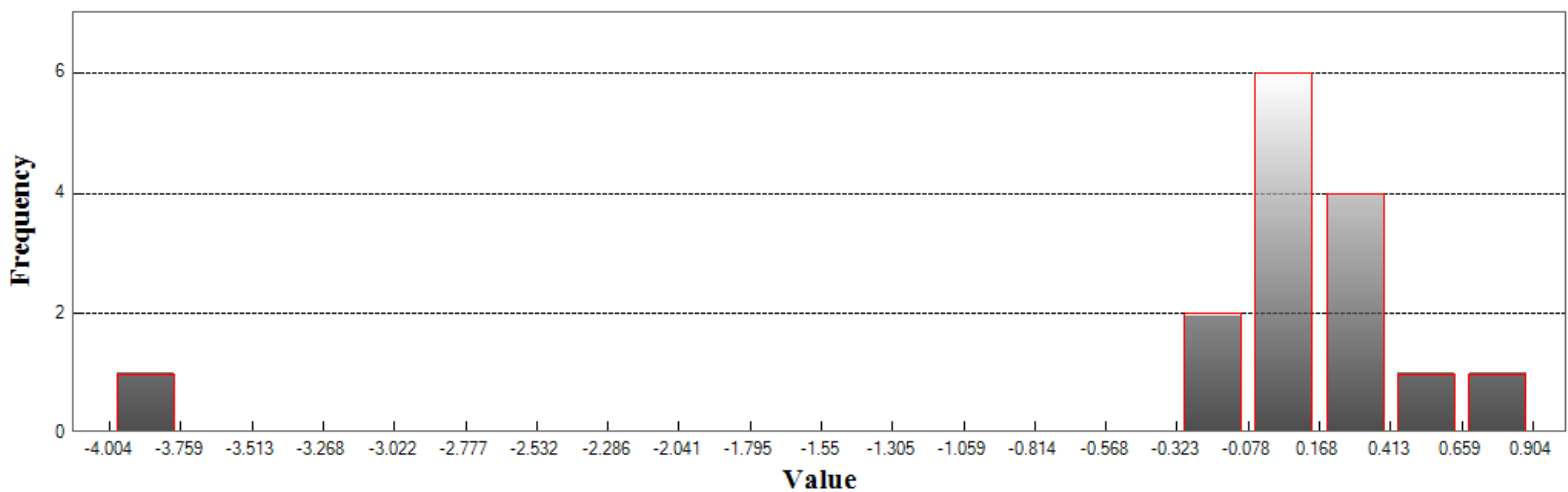


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -4.004  
Maximum DZ: 0.904  
Mean DZ: -0.106  
Mean Magnitude DZ: 0.691  
Number Observations: 15  
Standard Deviation DZ: 1.111  
RMSE Z: 1.079  
95th Percentile: 1.834  
Units: US Survey Feet

## Histogram



Min: -4.004

Max: 0.904

Number Of Bins: 20

Bin Interval: 0.245



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2M, 2H

Minimum DZ: -4.004

Maximum DZ: 0.904

Mean DZ: -0.044

Mean Magnitude DZ: 0.516

Number Observations: 45

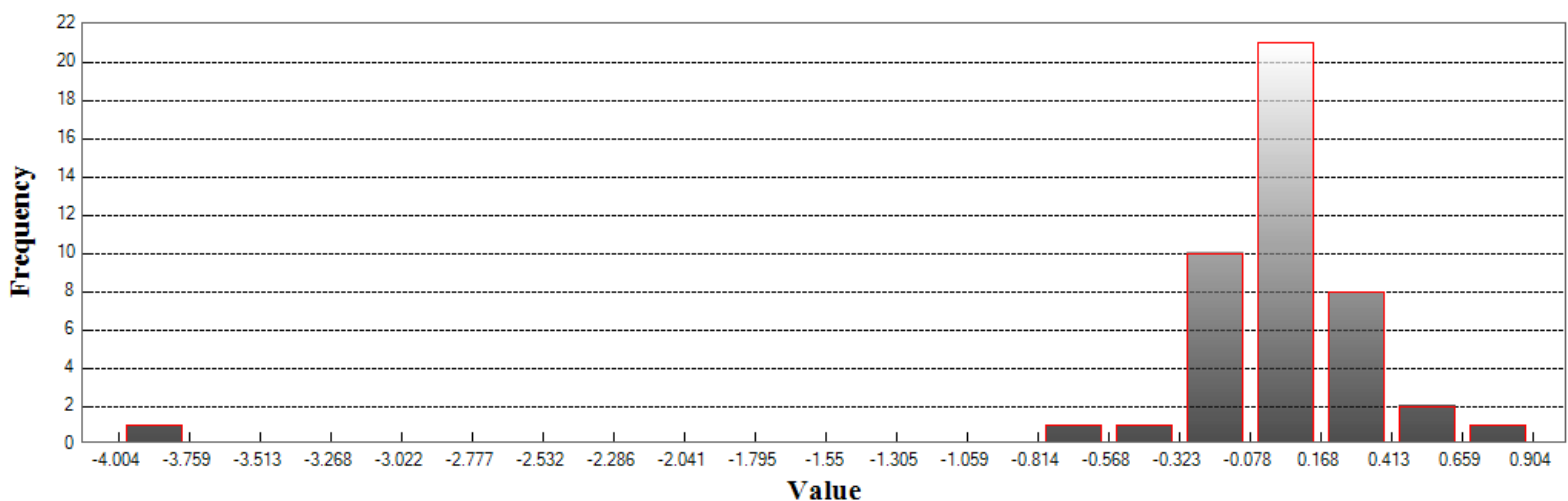
Standard Deviation DZ: 0.653

RMSE Z: 0.647

95th Percentile: 0.625

Units: US Survey Feet

## Histogram



Min: -4.004

Max: 0.904

Number Of Bins: 20

Bin Interval: 0.245



**NORTH CAROLINA GEODETIC SURVEY**

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## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/27/2015 Finish: 3/27/2015

---

## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

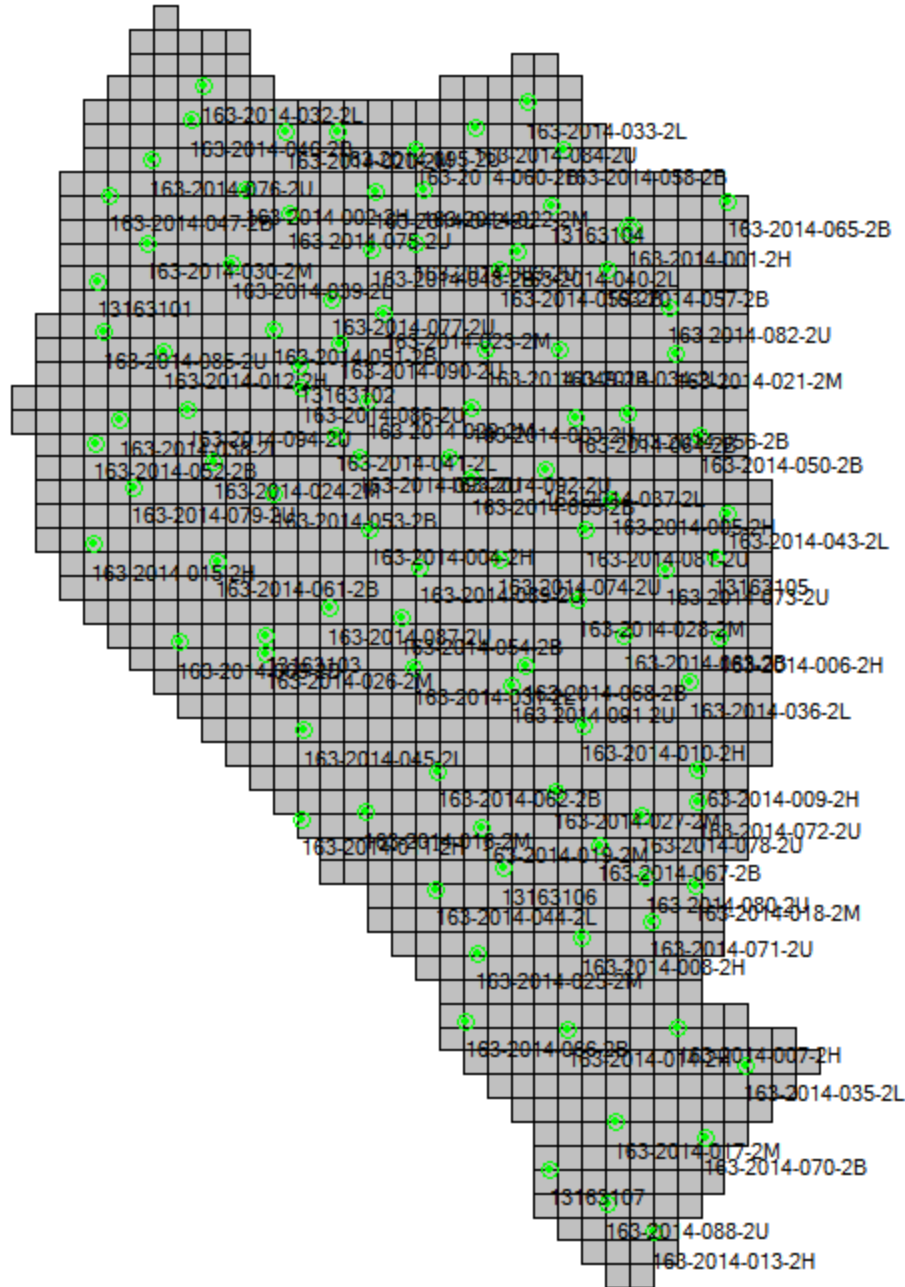
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\SampsonCoNC\Masspoints

Number of Data Files Matching Attribute: 1083 out of 1084



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	101			
2H	14		0.487	0.487
2M	15		0.754	0.754
2L	15		0.375	0.375
2B	32	0.334	0.286	
2U	25	0.344	0.294	
Total	101			

Units: US Survey Feet

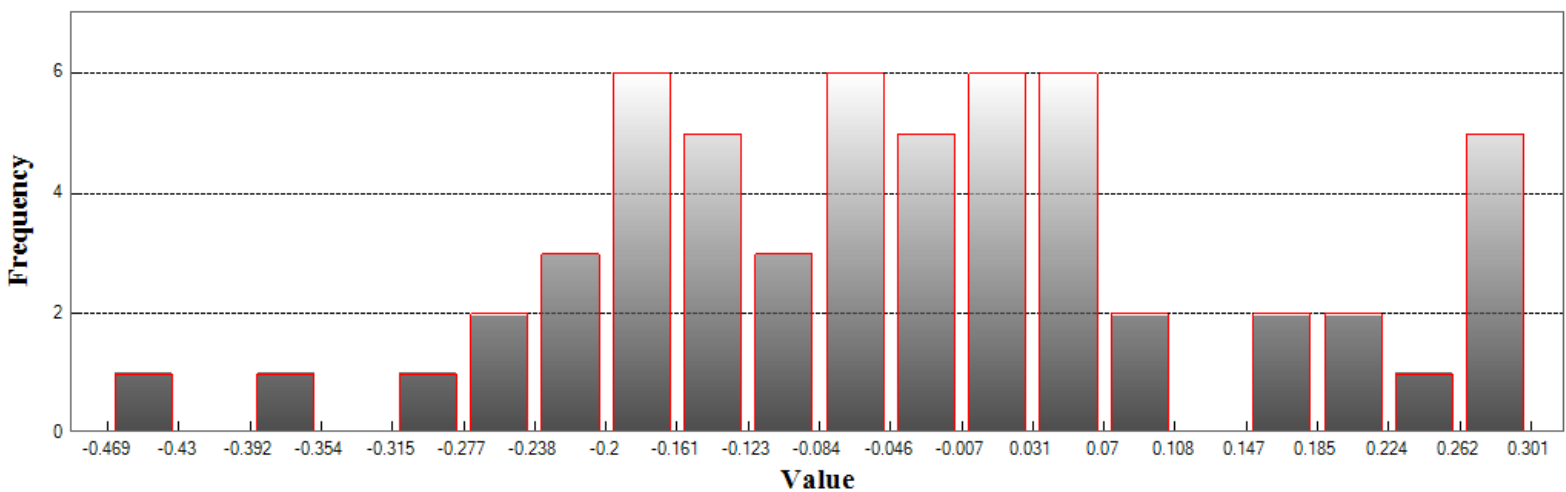


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2B, 2U  
Minimum DZ: -0.469  
Maximum DZ: 0.301  
Mean DZ: -0.034  
Mean Magnitude DZ: 0.37  
Number Observations: 57  
Standard Deviation DZ: 0.171  
RMSE Z: 0.173  
95% Confidence Level Z: 0.338  
Units: US Survey Feet

# Histogram



Min: -0.469  
Max: 0.301  
Number Of Bins: 20  
Bin Interval: 0.038

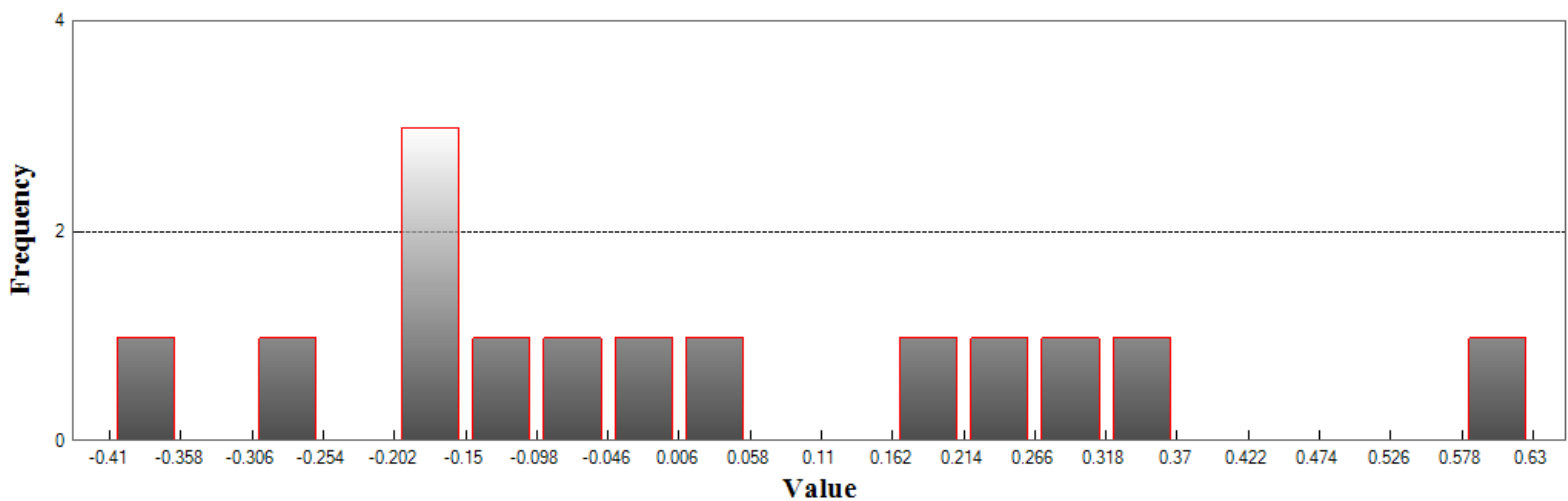


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.41  
Maximum DZ: 0.63  
Mean DZ: 0.023  
Mean Magnitude DZ: 0.479  
Number Observations: 14  
Standard Deviation DZ: 0.287  
RMSE Z: 0.278  
95th Percentile: 0.487  
Units: US Survey Feet

## Histogram



Min: -0.41  
Max: 0.63  
Number Of Bins: 20  
Bin Interval: 0.052

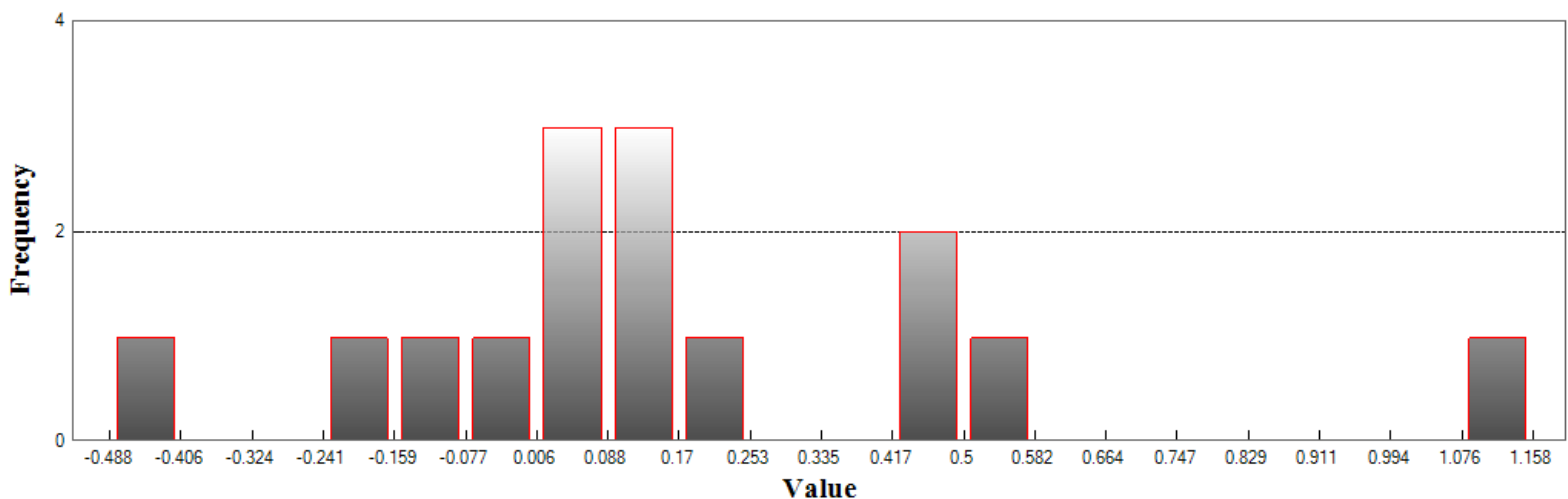


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.488  
Maximum DZ: 1.159  
Mean DZ: 0.17  
Mean Magnitude DZ: 0.525  
Number Observations: 15  
Standard Deviation DZ: 0.383  
RMSE Z: 0.407  
95th Percentile: 0.754  
Units: US Survey Feet

## Histogram



Min: -0.488

Max: 1.159

Number Of Bins: 20

Bin Interval: 0.082

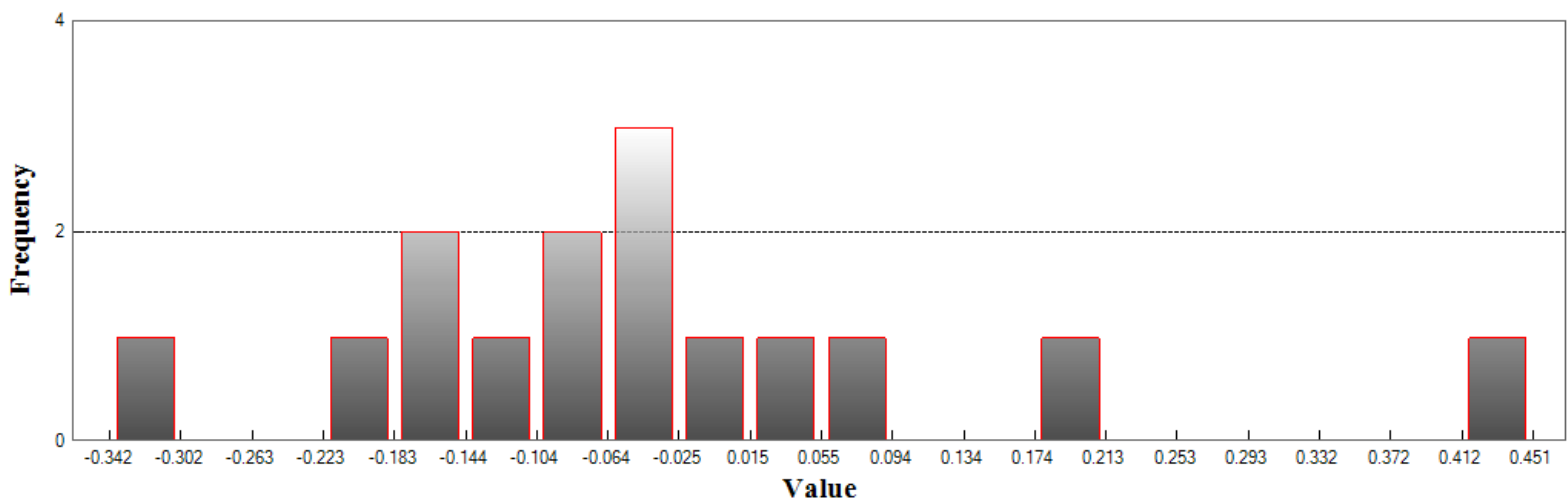


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.342  
Maximum DZ: 0.451  
Mean DZ: -0.039  
Mean Magnitude DZ: 0.376  
Number Observations: 15  
Standard Deviation DZ: 0.188  
RMSE Z: 0.186  
95th Percentile: 0.375  
Units: US Survey Feet

## Histogram



Min: -0.342

Max: 0.451

Number Of Bins: 20

Bin Interval: 0.04

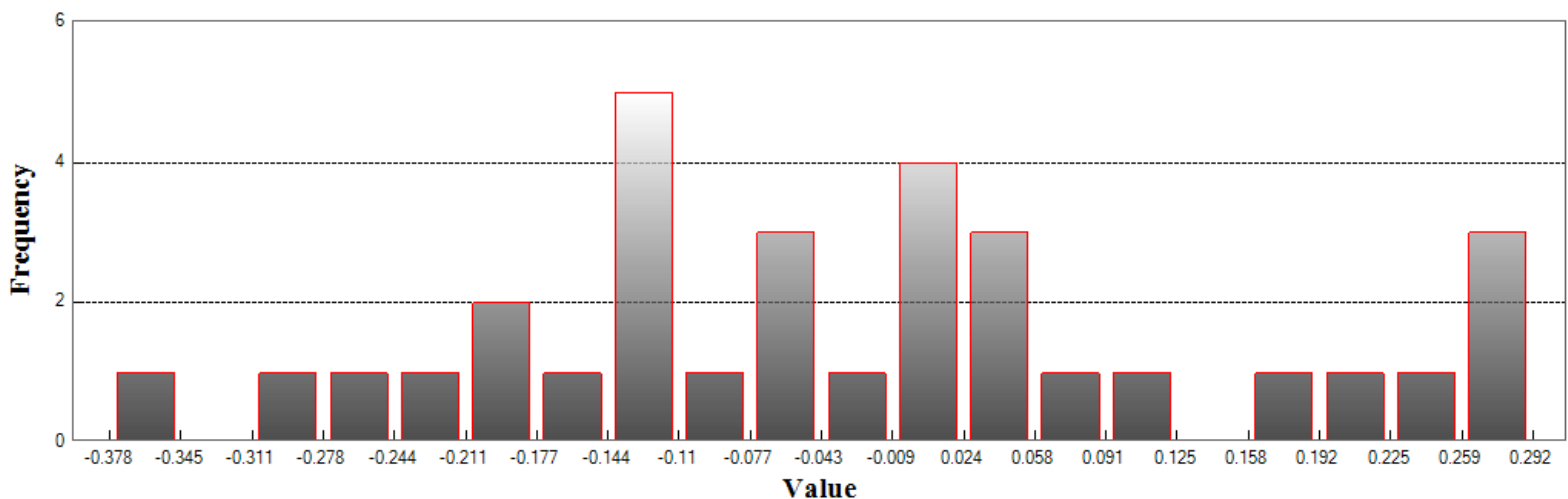


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.378  
Maximum DZ: 0.292  
Mean DZ: -0.026  
Mean Magnitude DZ: 0.371  
Number Observations: 32  
Standard Deviation DZ: 0.171  
RMSE Z: 0.17  
95th Percentile: 0.286  
Units: US Survey Feet

## Histogram



Min: -0.378

Max: 0.292

Number Of Bins: 20

Bin Interval: 0.034



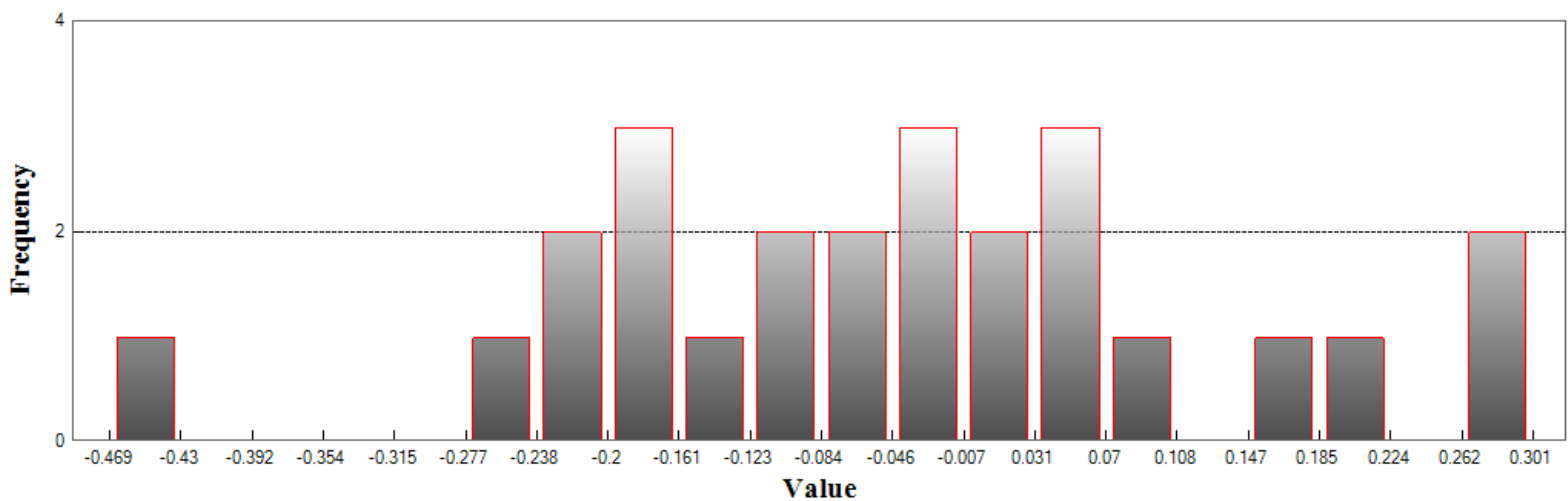


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.469  
Maximum DZ: 0.301  
Mean DZ: -0.044  
Mean Magnitude DZ: 0.368  
Number Observations: 25  
Standard Deviation DZ: 0.174  
RMSE Z: 0.176  
95th Percentile: 0.294  
Units: US Survey Feet

## Histogram



Min: -0.469

Max: 0.301

Number Of Bins: 20

Bin Interval: 0.038



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2H, 2M, 2L

Minimum DZ: -0.488

Maximum DZ: 1.159

Mean DZ: 0.052

Mean Magnitude DZ: 0.464

Number Observations: 44

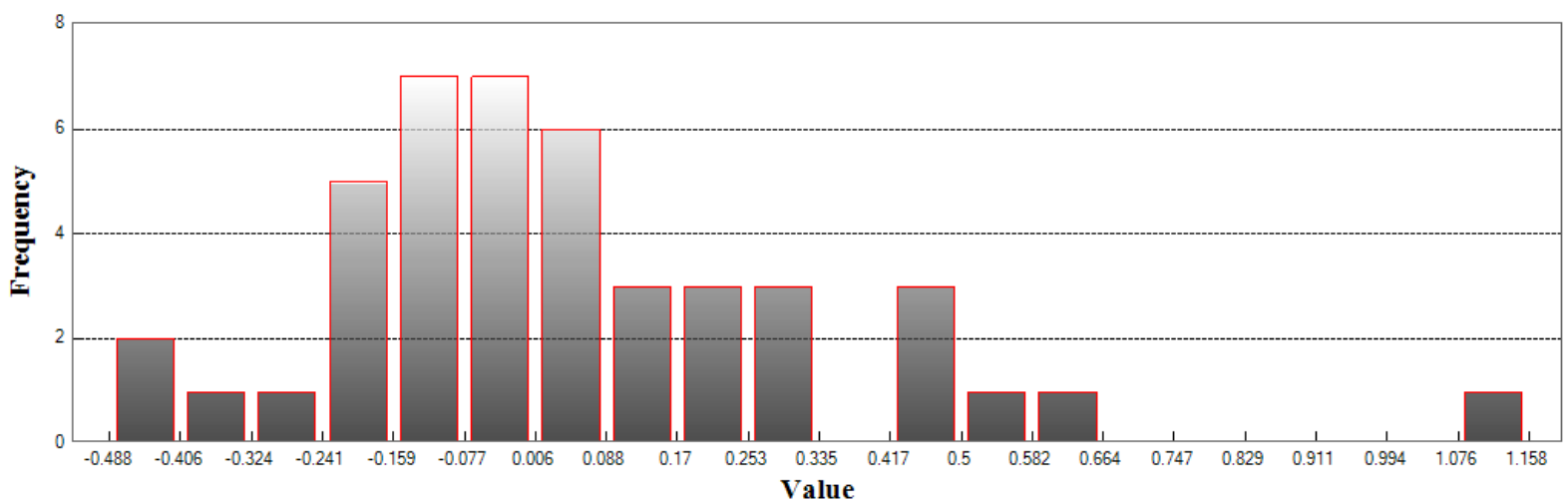
Standard Deviation DZ: 0.303

RMSE Z: 0.304

95th Percentile: 0.567

Units: US Survey Feet

## Histogram



Min: -0.488

Max: 1.159

Number Of Bins: 20

Bin Interval: 0.082

**NORTH CAROLINA GEODETIC SURVEY**

Claude T Bowers Building  
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Raleigh, North Carolina 27607  
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---

## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/23/2015 Finish: 3/23/2015

---

## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

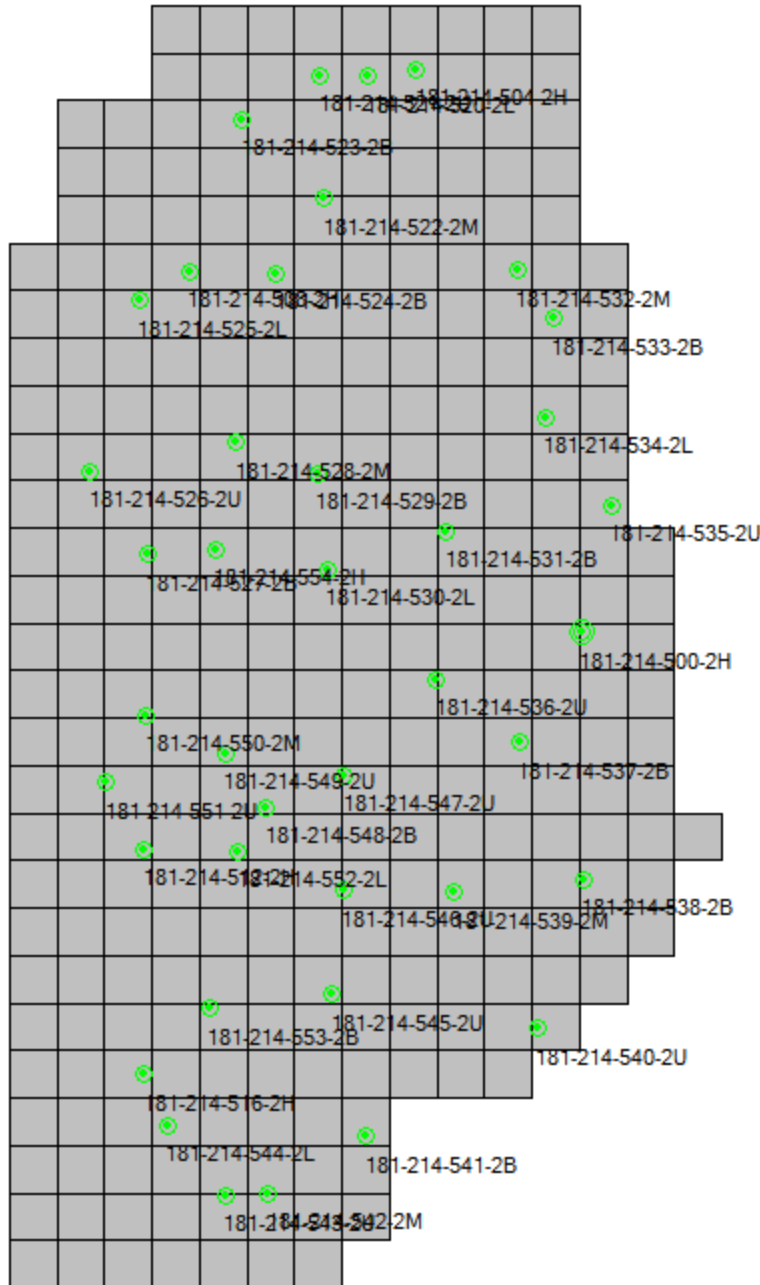
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\VanceCoNC\Masspoints

Number of Data Files Matching Attribute: Not Specified



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	40			
2H	6		0.451	0.451
2L	6		0.253	0.253
2U	11	0.252	0.240	
2M	6		0.678	0.678
2B	11	0.367	0.279	
Total	40			

Units: US Survey Feet

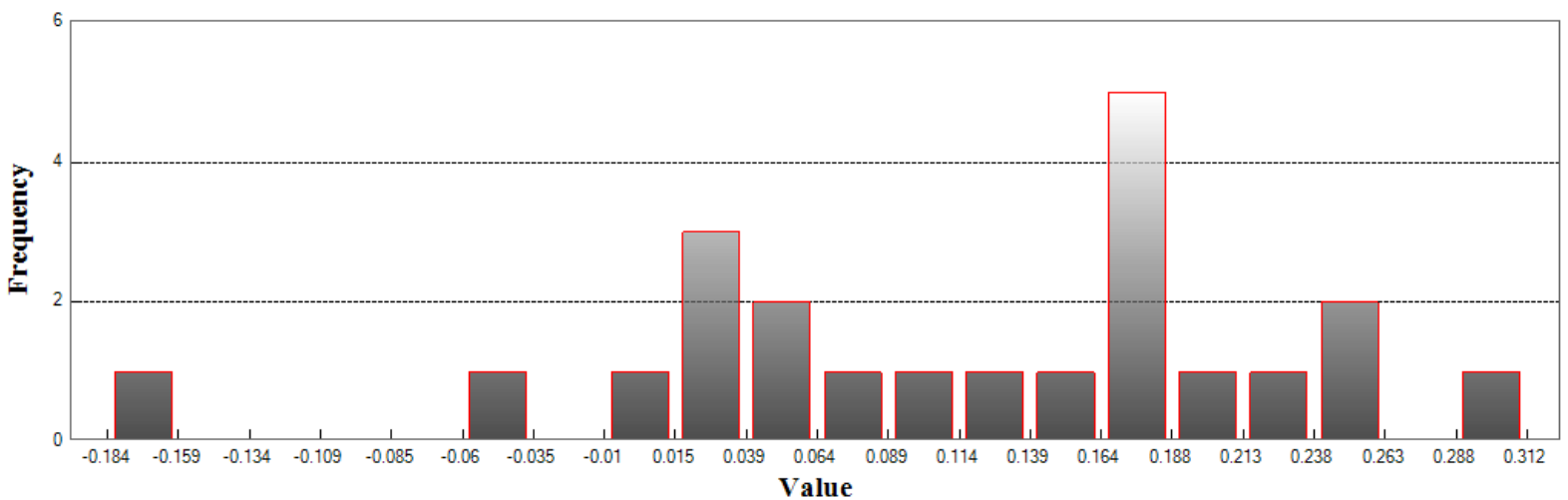


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B  
Minimum DZ: -0.184  
Maximum DZ: 0.313  
Mean DZ: 0.115  
Mean Magnitude DZ: 0.369  
Number Observations: 22  
Standard Deviation DZ: 0.114  
RMSE Z: 0.16  
95% Confidence Level Z: 0.314  
Units: US Survey Feet

# Histogram



Min: -0.184  
Max: 0.313  
Number Of Bins: 20  
Bin Interval: 0.025

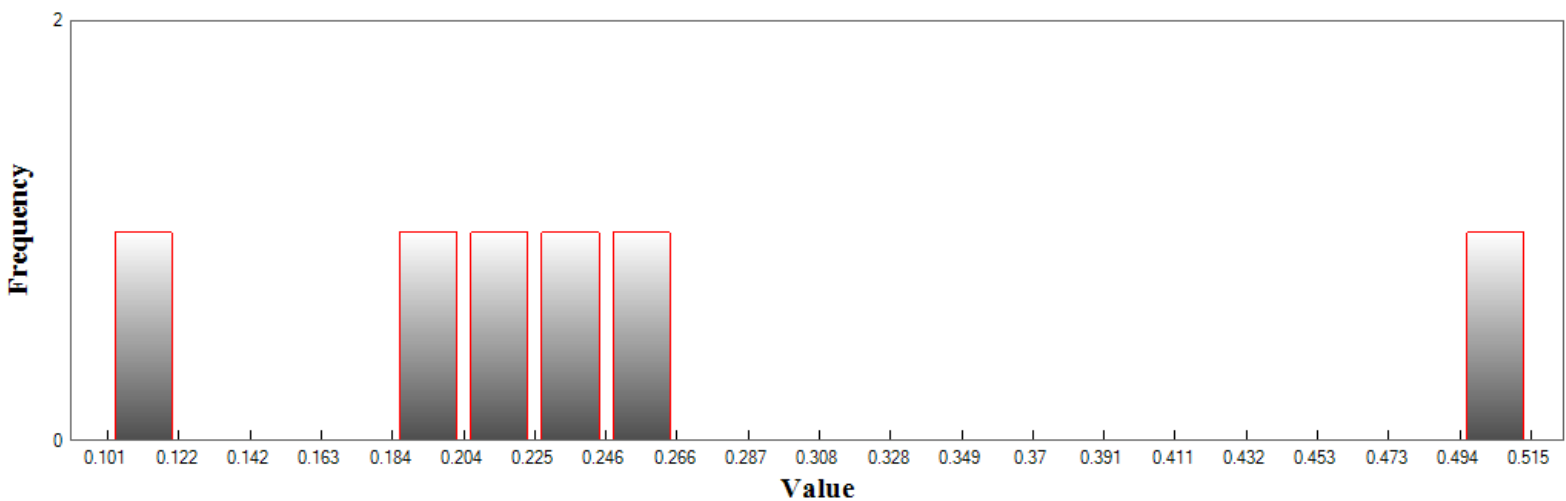


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: 0.101  
Maximum DZ: 0.515  
Mean DZ: 0.254  
Mean Magnitude DZ: 0.504  
Number Observations: 6  
Standard Deviation DZ: 0.139  
RMSE Z: 0.284  
95th Percentile: 0.451  
Units: US Survey Feet

## Histogram



Min: 0.101

Max: 0.515

Number Of Bins: 20

Bin Interval: 0.021

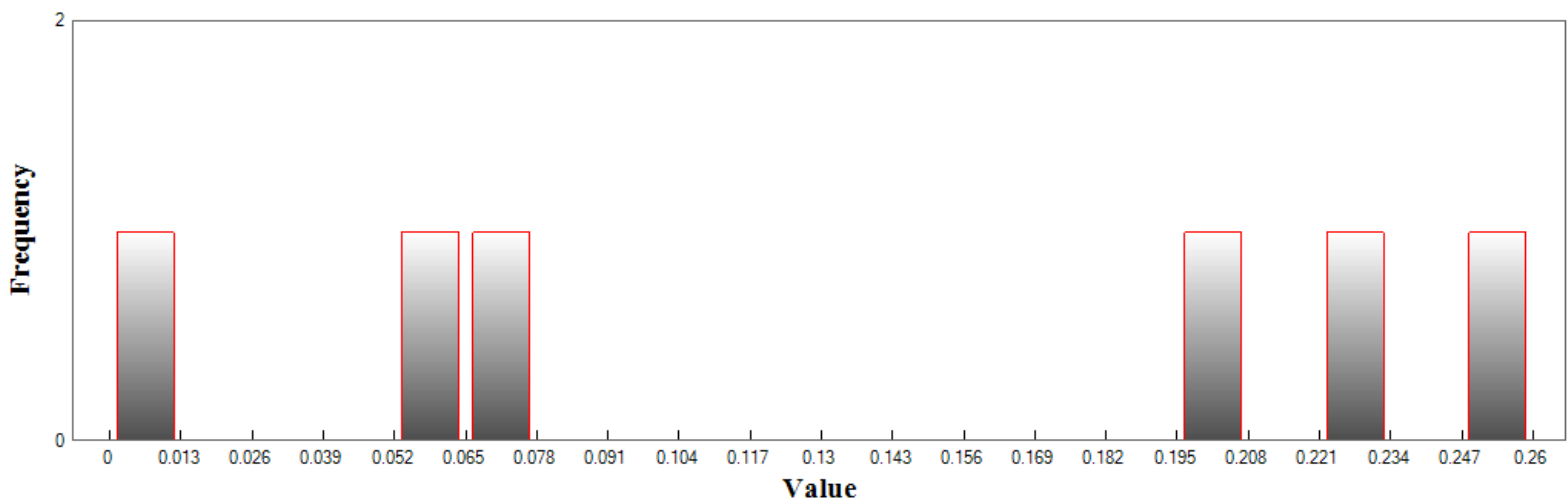


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: 0  
Maximum DZ: 0.26  
Mean DZ: 0.136  
Mean Magnitude DZ: 0.369  
Number Observations: 6  
Standard Deviation DZ: 0.108  
RMSE Z: 0.168  
95th Percentile: 0.253  
Units: US Survey Feet

## Histogram



Min: 0

Max: 0.26

Number Of Bins: 20

Bin Interval: 0.013



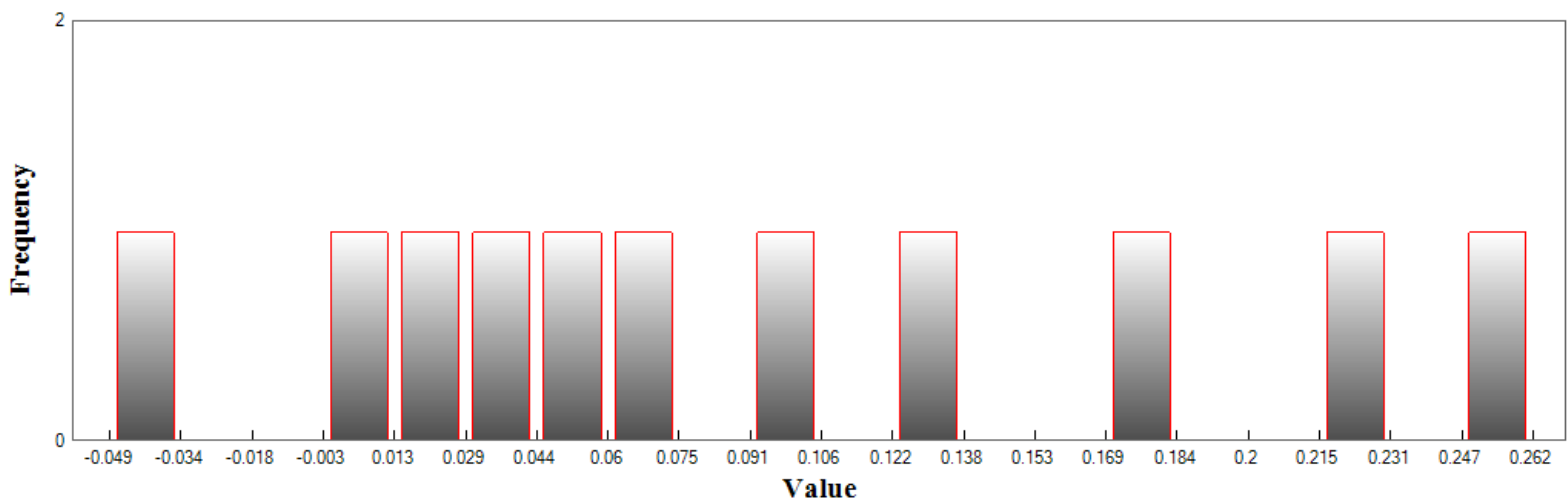


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.05  
Maximum DZ: 0.262  
Mean DZ: 0.092  
Mean Magnitude DZ: 0.318  
Number Observations: 11  
Standard Deviation DZ: 0.094  
RMSE Z: 0.128  
95th Percentile: 0.24  
Units: US Survey Feet

## Histogram



Min: -0.05

Max: 0.262

Number Of Bins: 20

Bin Interval: 0.016

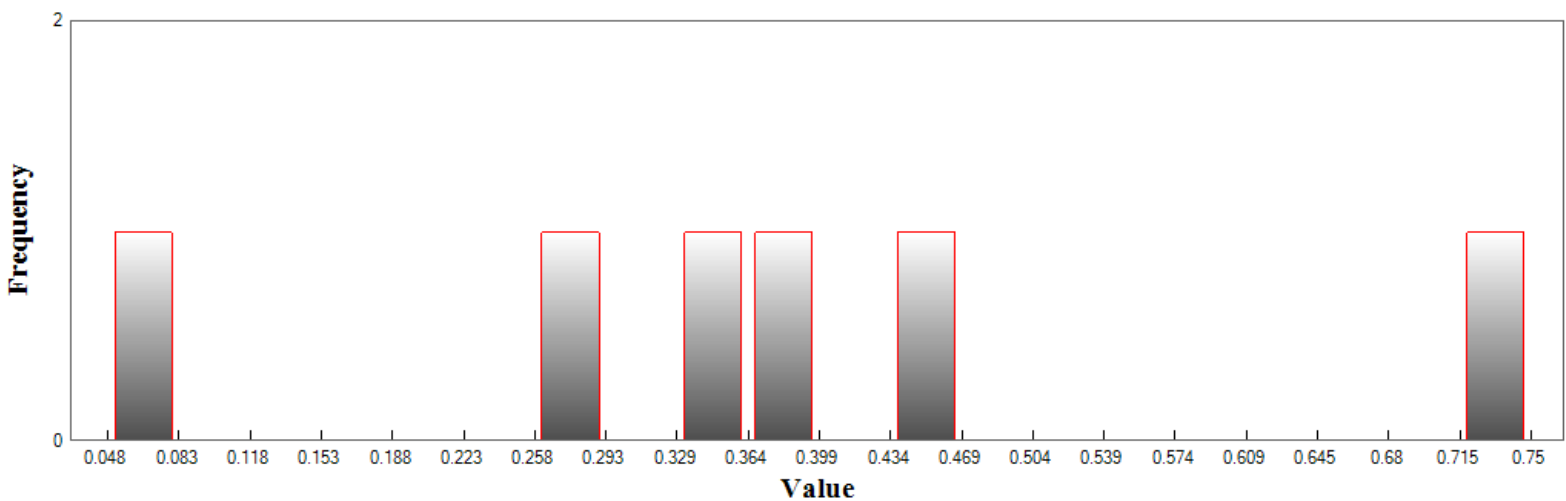


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: 0.047  
Maximum DZ: 0.749  
Mean DZ: 0.379  
Mean Magnitude DZ: 0.615  
Number Observations: 6  
Standard Deviation DZ: 0.23  
RMSE Z: 0.433  
95th Percentile: 0.678  
Units: US Survey Feet

## Histogram



Min: 0.047

Max: 0.749

Number Of Bins: 20

Bin Interval: 0.035

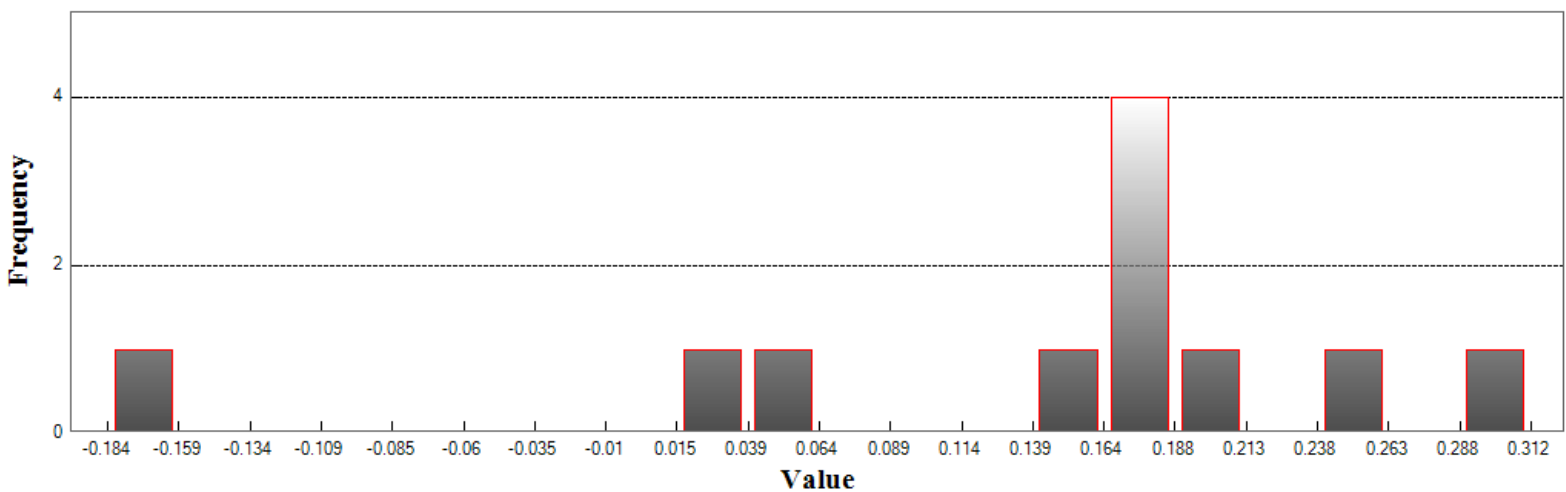


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.184  
Maximum DZ: 0.313  
Mean DZ: 0.138  
Mean Magnitude DZ: 0.414  
Number Observations: 11  
Standard Deviation DZ: 0.132  
RMSE Z: 0.187  
95th Percentile: 0.279  
Units: US Survey Feet

## Histogram



Min: -0.184

Max: 0.313

Number Of Bins: 20

Bin Interval: 0.025



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2H, 2L, 2M

Minimum DZ: 0

Maximum DZ: 0.749

Mean DZ: 0.256

Mean Magnitude DZ: 0.506

Number Observations: 18

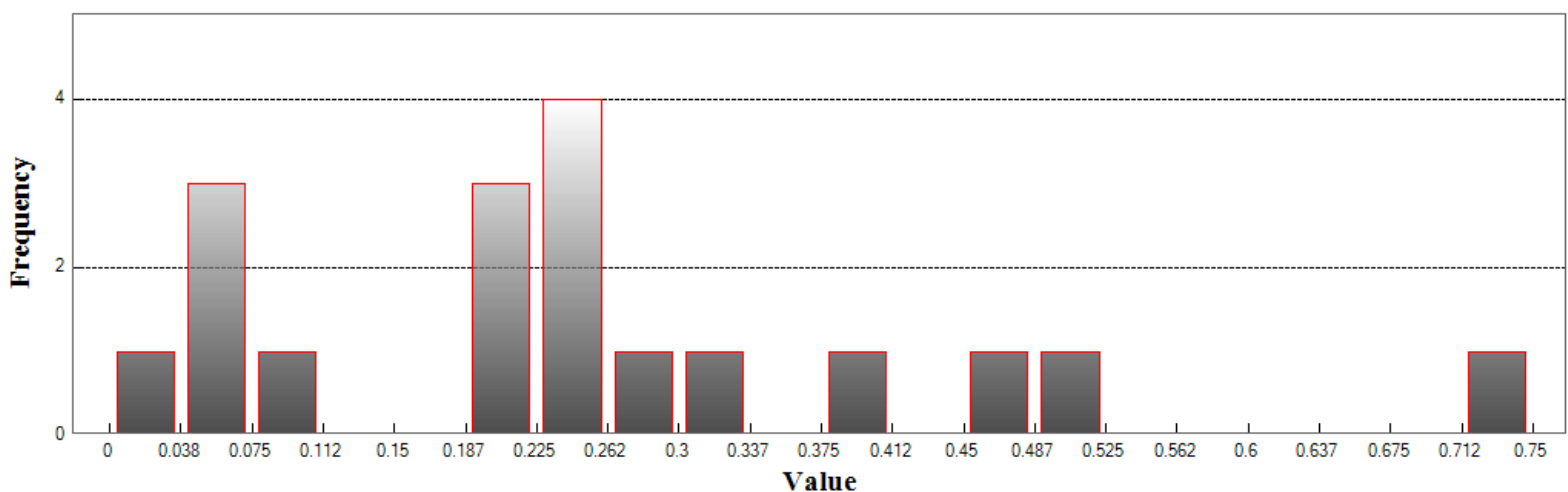
Standard Deviation DZ: 0.187

RMSE Z: 0.314

95th Percentile: 0.55

Units: US Survey Feet

## Histogram



Min: 0

Max: 0.749

Number Of Bins: 20

Bin Interval: 0.037

**NORTH CAROLINA GEODETIC SURVEY**

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



---

## Project Information

Prepared By: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/23/2015 Finish: 3/23/2015

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## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

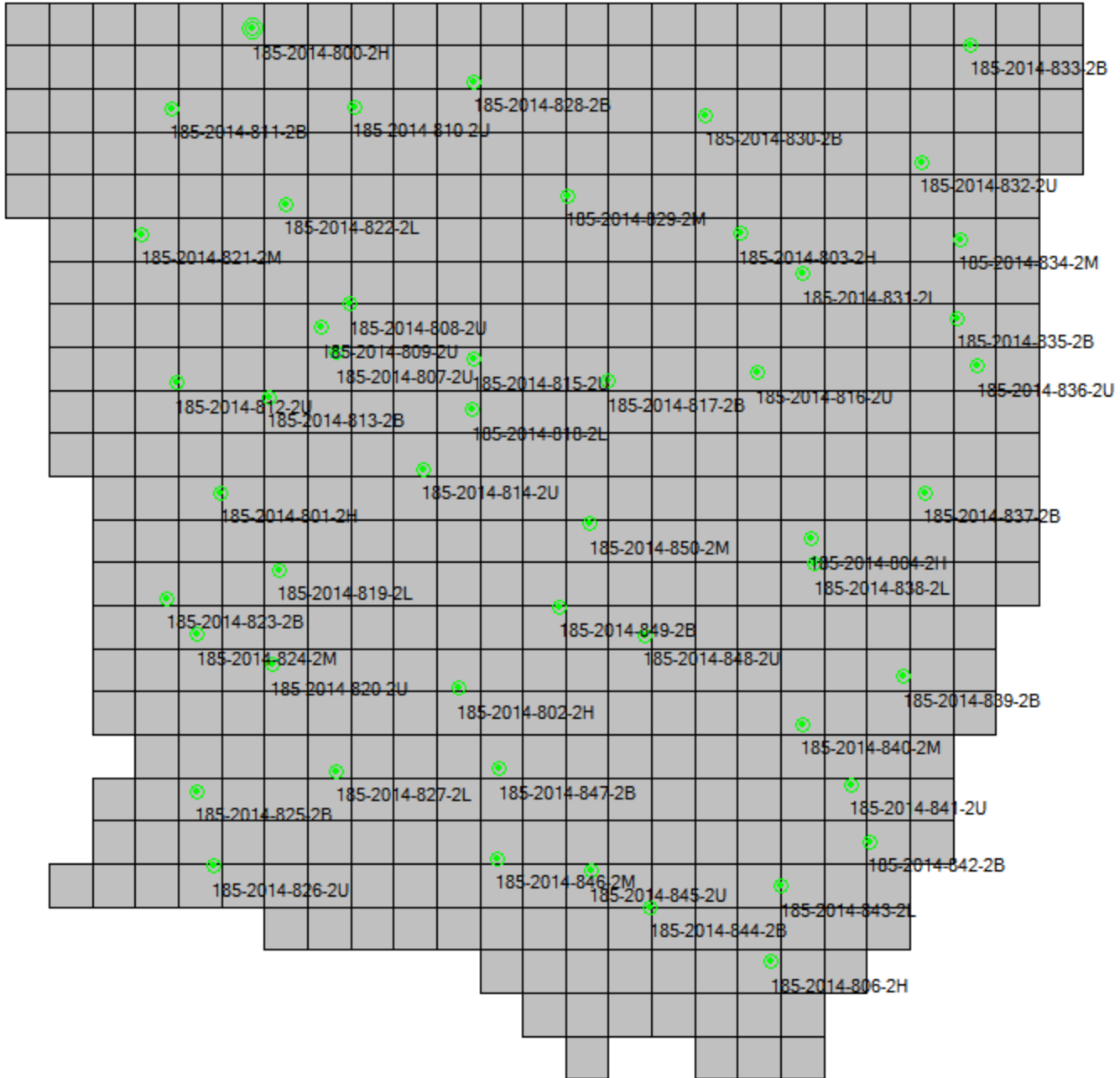
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\WarrenCoNC\Masspoints

Number of Data Files Matching Attribute: Not Specified



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	50			
2H	6		0.423	0.423
2U	15	0.291	0.259	
2B	15	0.556	0.501	
2L	7		0.434	0.434
2M	7		0.458	0.458
Total	50			

Units: US Survey Feet

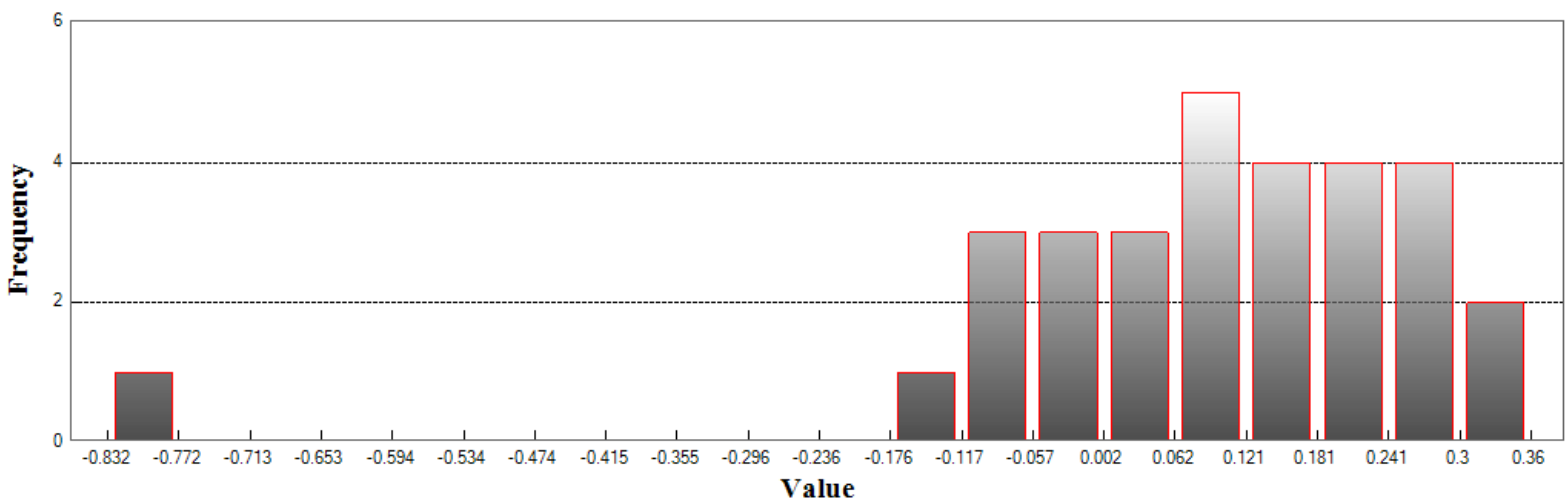


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B  
Minimum DZ: -0.832  
Maximum DZ: 0.36  
Mean DZ: 0.076  
Mean Magnitude DZ: 0.409  
Number Observations: 30  
Standard Deviation DZ: 0.217  
RMSE Z: 0.226  
95% Confidence Level Z: 0.443  
Units: US Survey Feet

# Histogram



Min: -0.832  
Max: 0.36  
Number Of Bins: 20  
Bin Interval: 0.06



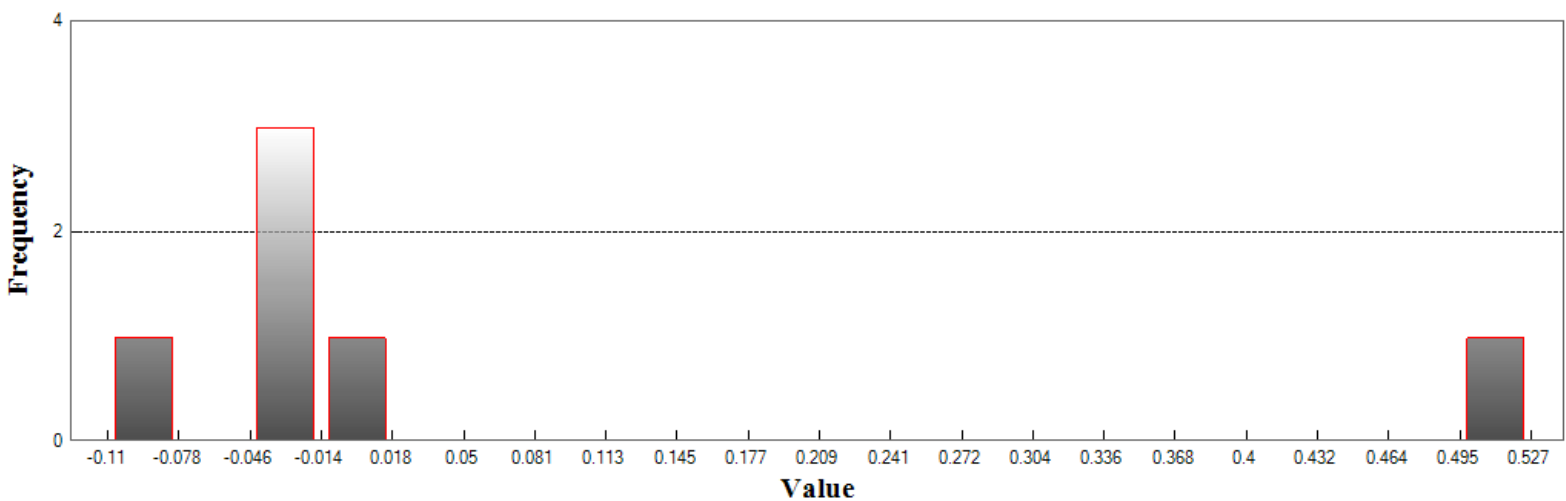


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.11  
Maximum DZ: 0.527  
Mean DZ: 0.058  
Mean Magnitude DZ: 0.343  
Number Observations: 6  
Standard Deviation DZ: 0.233  
RMSE Z: 0.22  
95th Percentile: 0.423  
Units: US Survey Feet

## Histogram



Min: -0.11

Max: 0.527

Number Of Bins: 20

Bin Interval: 0.032

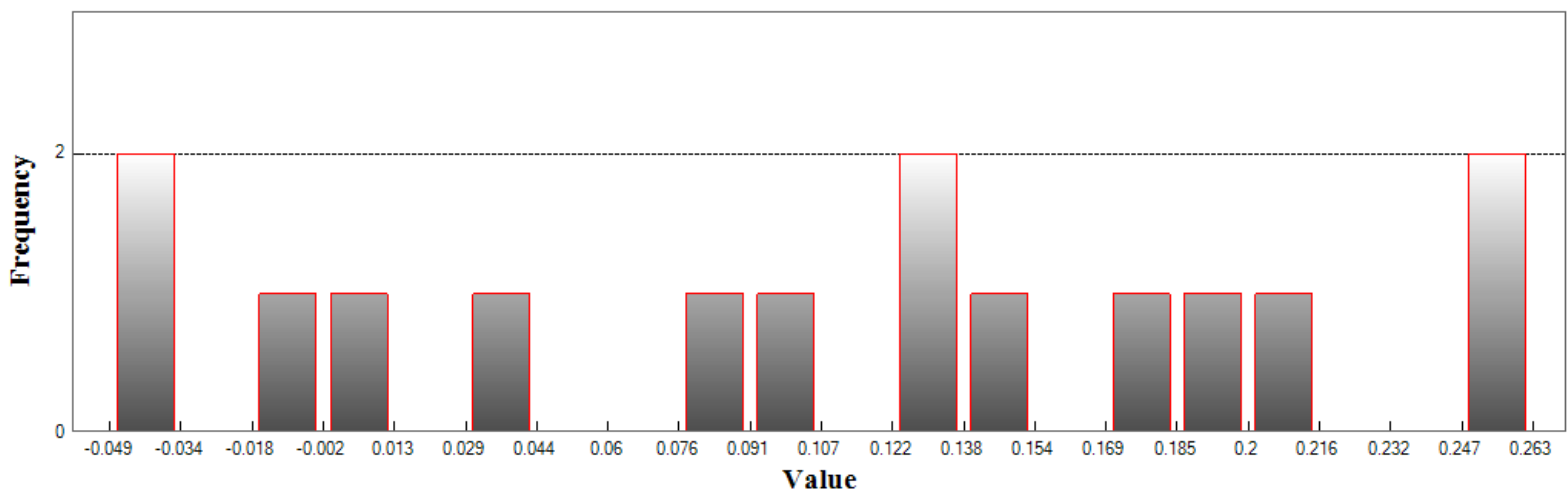


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.049  
Maximum DZ: 0.263  
Mean DZ: 0.11  
Mean Magnitude DZ: 0.351  
Number Observations: 15  
Standard Deviation DZ: 0.103  
RMSE Z: 0.148  
95th Percentile: 0.259  
Units: US Survey Feet

## Histogram



Min: -0.049  
Max: 0.263  
Number Of Bins: 20  
Bin Interval: 0.016

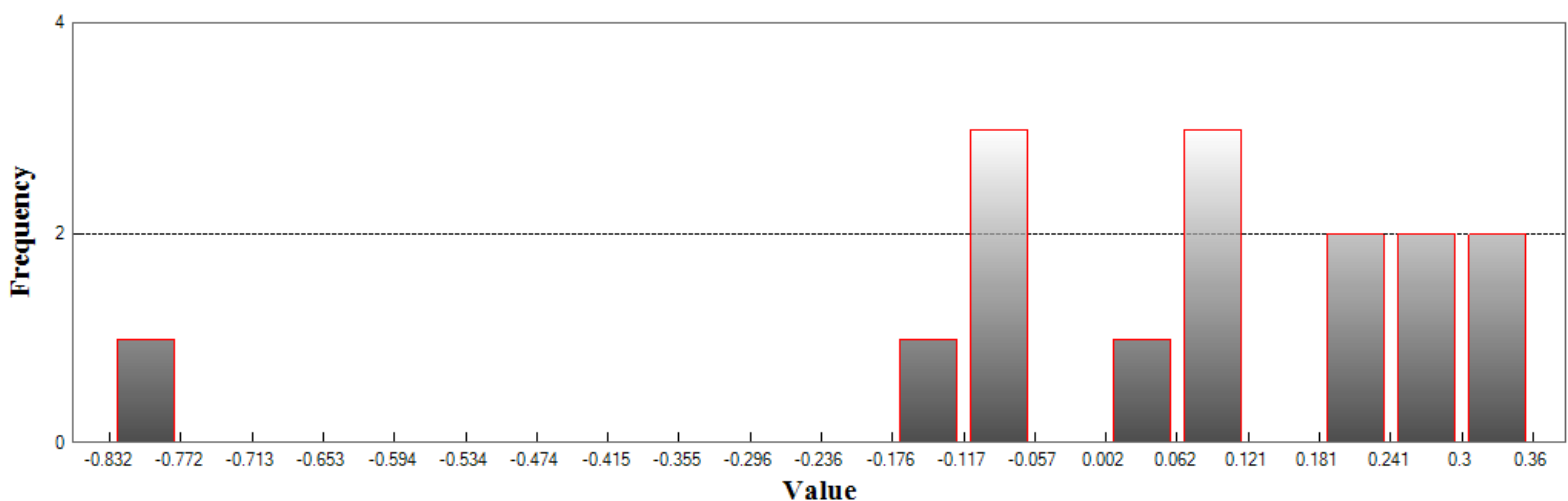


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.832  
Maximum DZ: 0.36  
Mean DZ: 0.043  
Mean Magnitude DZ: 0.459  
Number Observations: 15  
Standard Deviation DZ: 0.29  
RMSE Z: 0.283  
95th Percentile: 0.501  
Units: US Survey Feet

## Histogram



Min: -0.832

Max: 0.36

Number Of Bins: 20

Bin Interval: 0.06

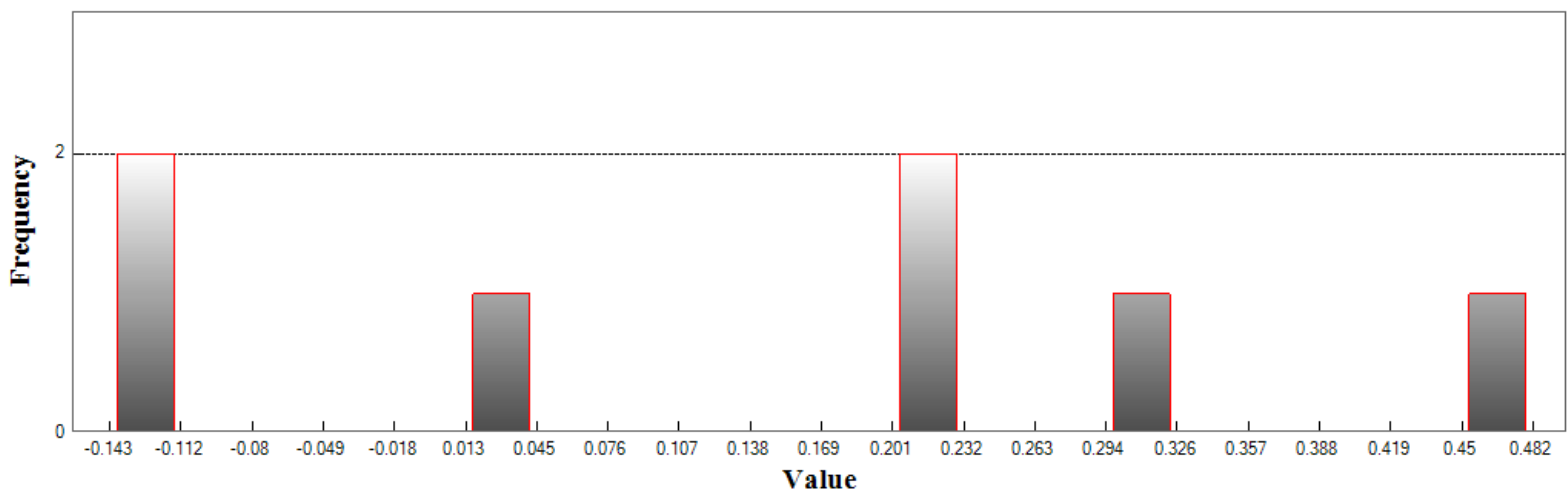


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.143  
Maximum DZ: 0.481  
Mean DZ: 0.14  
Mean Magnitude DZ: 0.471  
Number Observations: 7  
Standard Deviation DZ: 0.236  
RMSE Z: 0.259  
95th Percentile: 0.434  
Units: US Survey Feet

## Histogram



Min: -0.143

Max: 0.481

Number Of Bins: 20

Bin Interval: 0.031

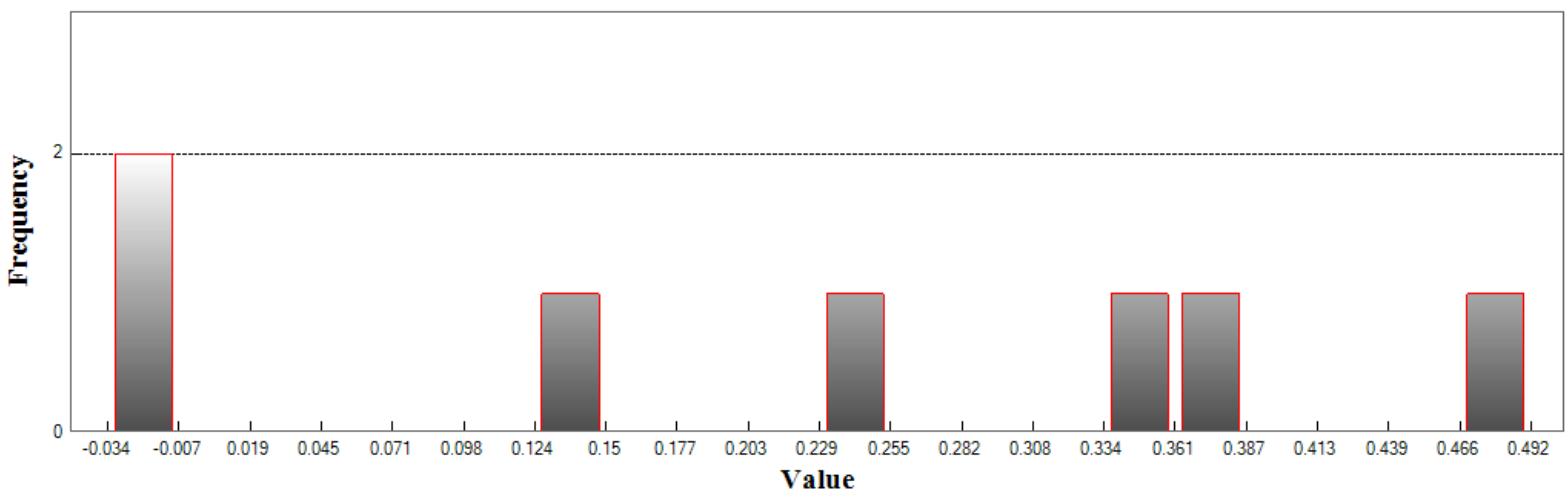


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.034  
Maximum DZ: 0.492  
Mean DZ: 0.222  
Mean Magnitude DZ: 0.488  
Number Observations: 7  
Standard Deviation DZ: 0.204  
RMSE Z: 0.291  
95th Percentile: 0.458  
Units: US Survey Feet

## Histogram



Min: -0.034

Max: 0.492

Number Of Bins: 20

Bin Interval: 0.026



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2H, 2L, 2M

Minimum DZ: -0.143

Maximum DZ: 0.527

Mean DZ: 0.144

Mean Magnitude DZ: 0.443

Number Observations: 20

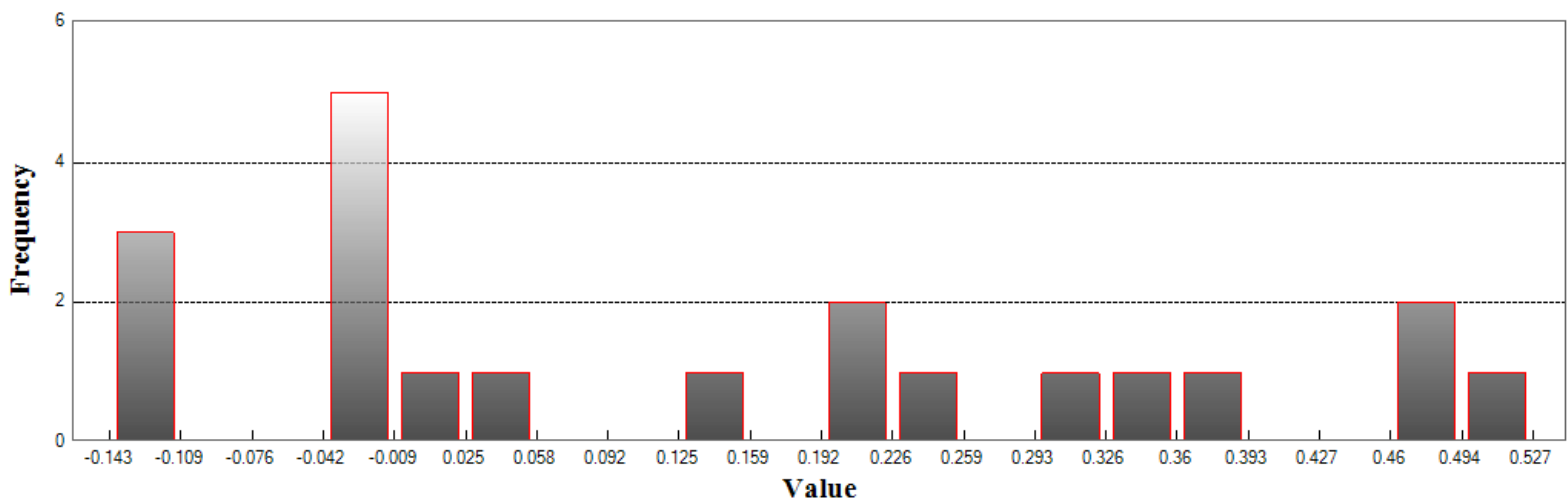
Standard Deviation DZ: 0.222

RMSE Z: 0.26

95th Percentile: 0.494

Units: US Survey Feet

## Histogram



Min: -0.143

Max: 0.527

Number Of Bins: 20

Bin Interval: 0.034

## 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: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/27/2015 Finish: 3/27/2015

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## Metadata Information

### Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

### Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

### LAS:

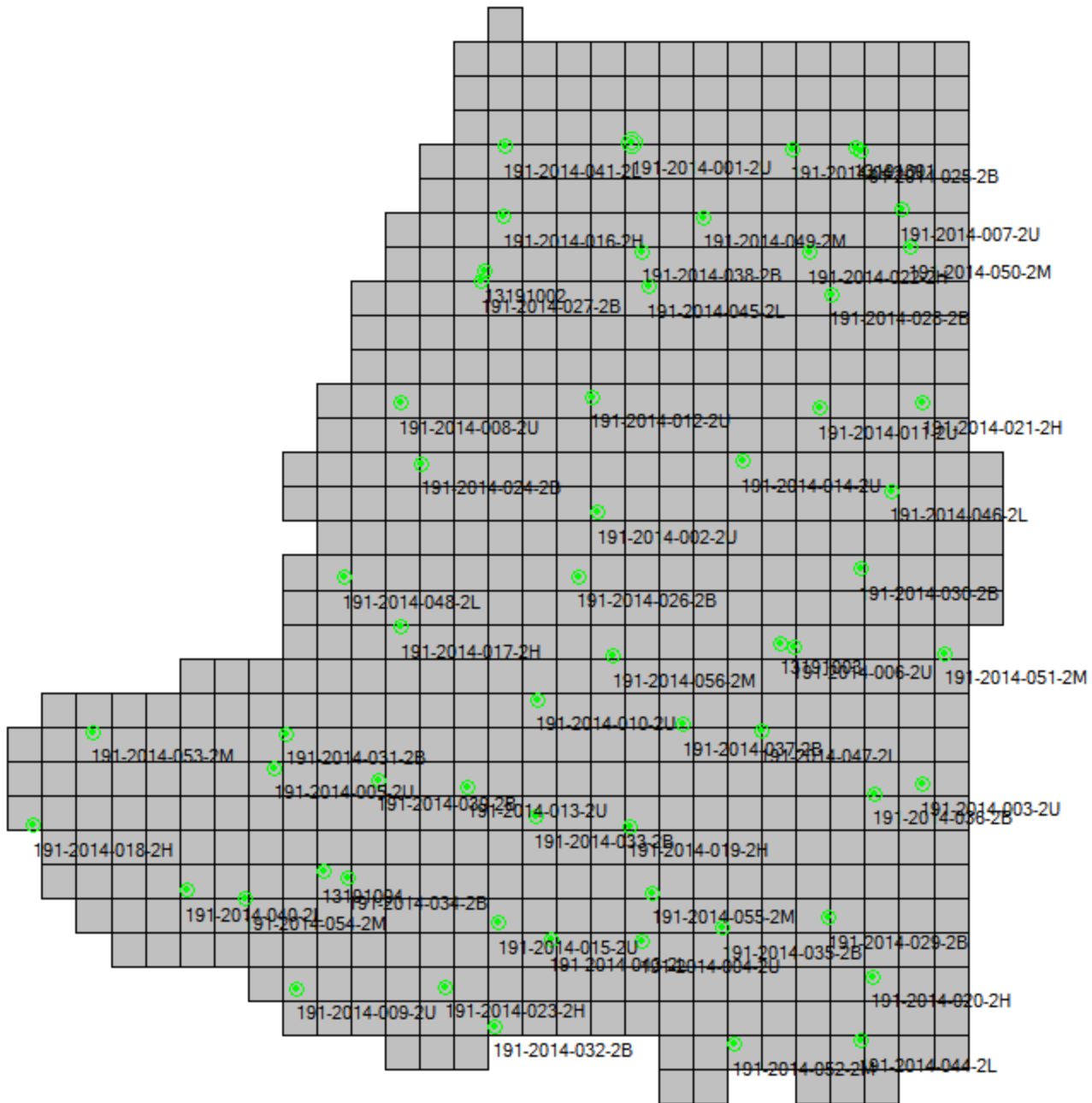
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\WayneCoNC\Masspoints

Number of Data Files Matching Attribute: 625 out of 625



## Tiled-Data Area







LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	60			
2U	19	0.477	0.412	
2H	8	0.644	0.602	
2B	16		0.283	0.283
2L	9		0.317	0.317
2M	8		0.486	0.486
Total	60			

Units: US Survey Feet

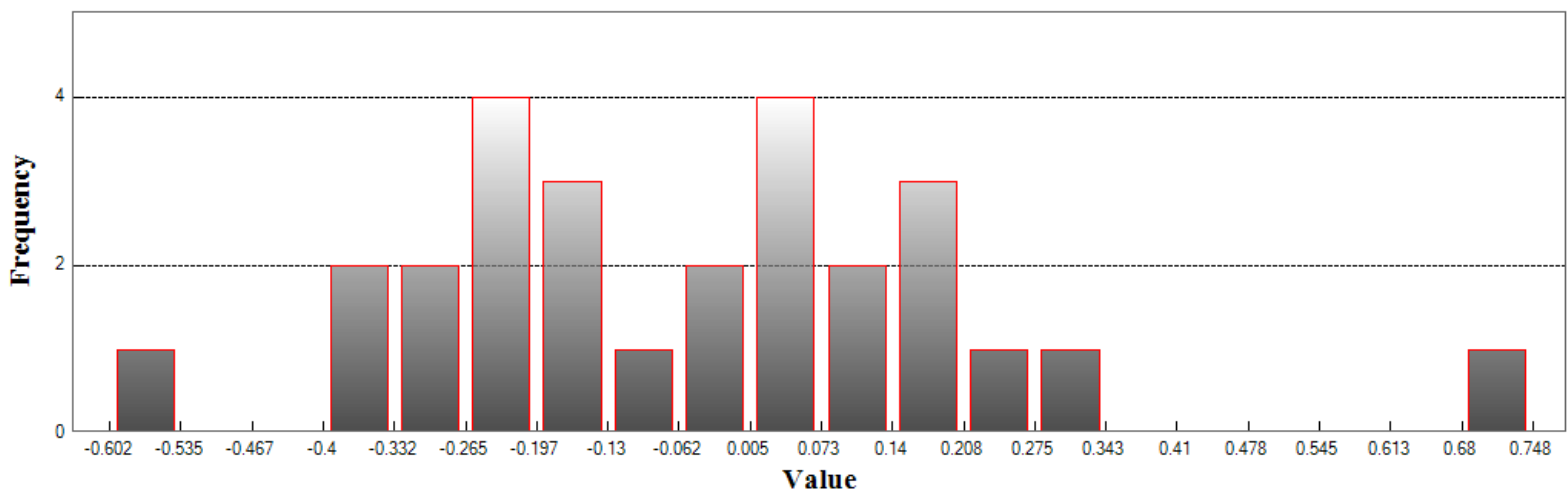


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2H  
Minimum DZ: -0.602  
Maximum DZ: 0.747  
Mean DZ: -0.05  
Mean Magnitude DZ: 0.466  
Number Observations: 27  
Standard Deviation DZ: 0.272  
RMSE Z: 0.271  
95% Confidence Level Z: 0.532  
Units: US Survey Feet

# Histogram



Min: -0.602  
Max: 0.747  
Number Of Bins: 20  
Bin Interval: 0.067

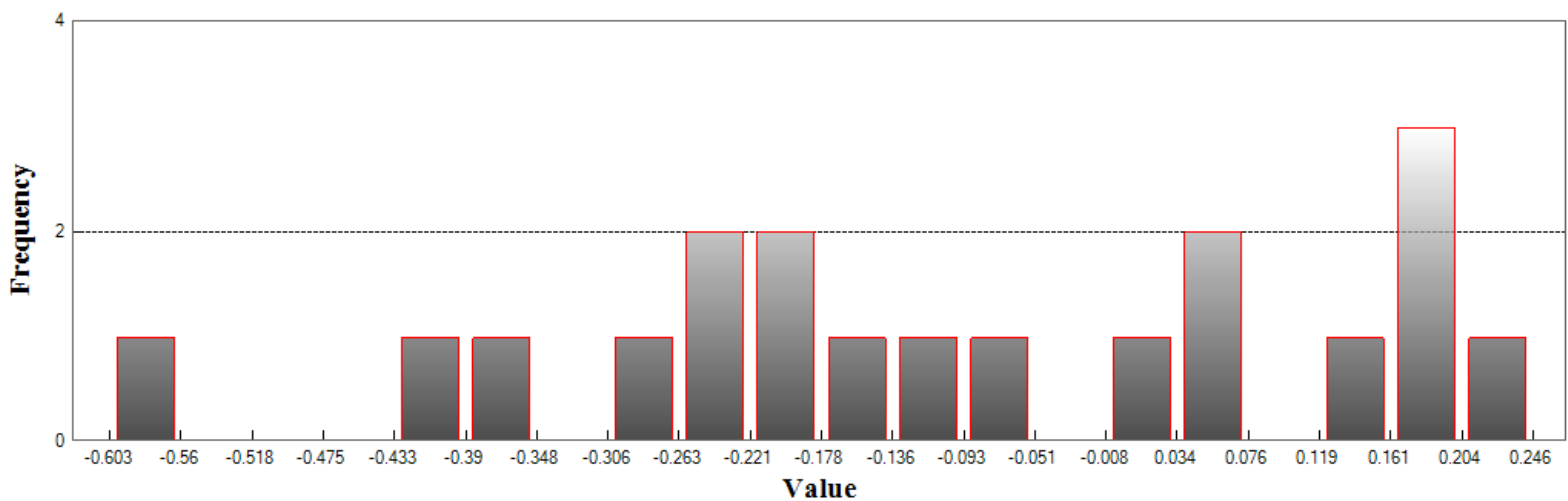


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.602  
Maximum DZ: 0.246  
Mean DZ: -0.094  
Mean Magnitude DZ: 0.45  
Number Observations: 19  
Standard Deviation DZ: 0.231  
RMSE Z: 0.243  
95th Percentile: 0.412  
Units: US Survey Feet

## Histogram



Min: -0.602

Max: 0.246

Number Of Bins: 20

Bin Interval: 0.042

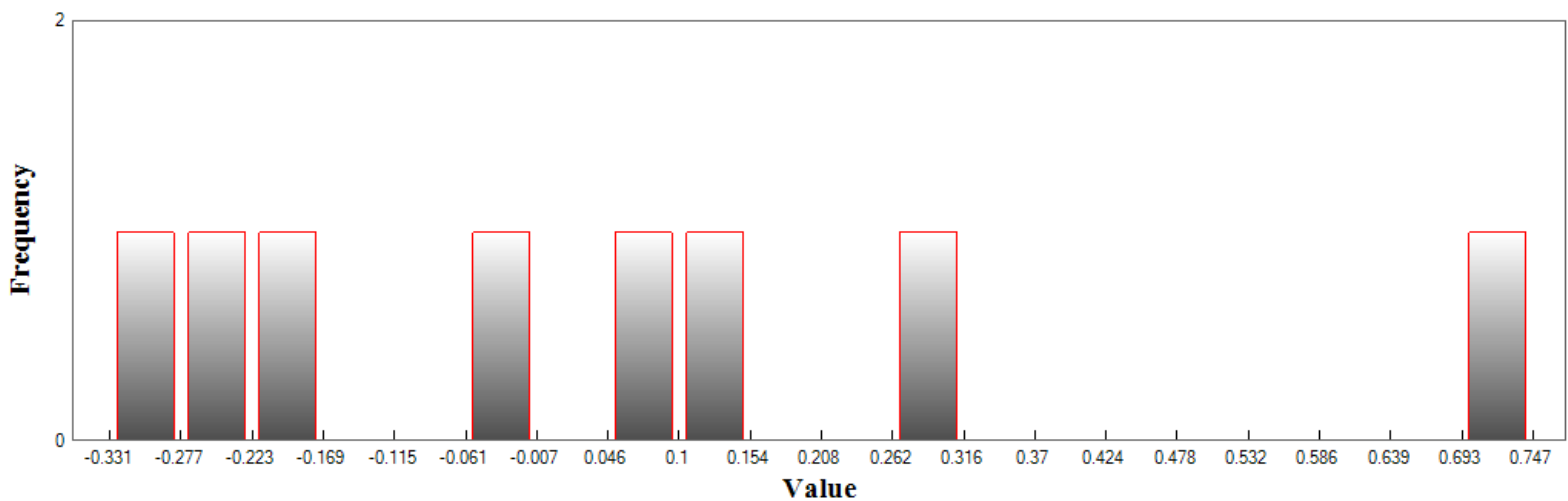


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: -0.331  
Maximum DZ: 0.747  
Mean DZ: 0.054  
Mean Magnitude DZ: 0.502  
Number Observations: 8  
Standard Deviation DZ: 0.346  
RMSE Z: 0.328  
95th Percentile: 0.602  
Units: US Survey Feet

## Histogram



Min: -0.331

Max: 0.747

Number Of Bins: 20

Bin Interval: 0.054

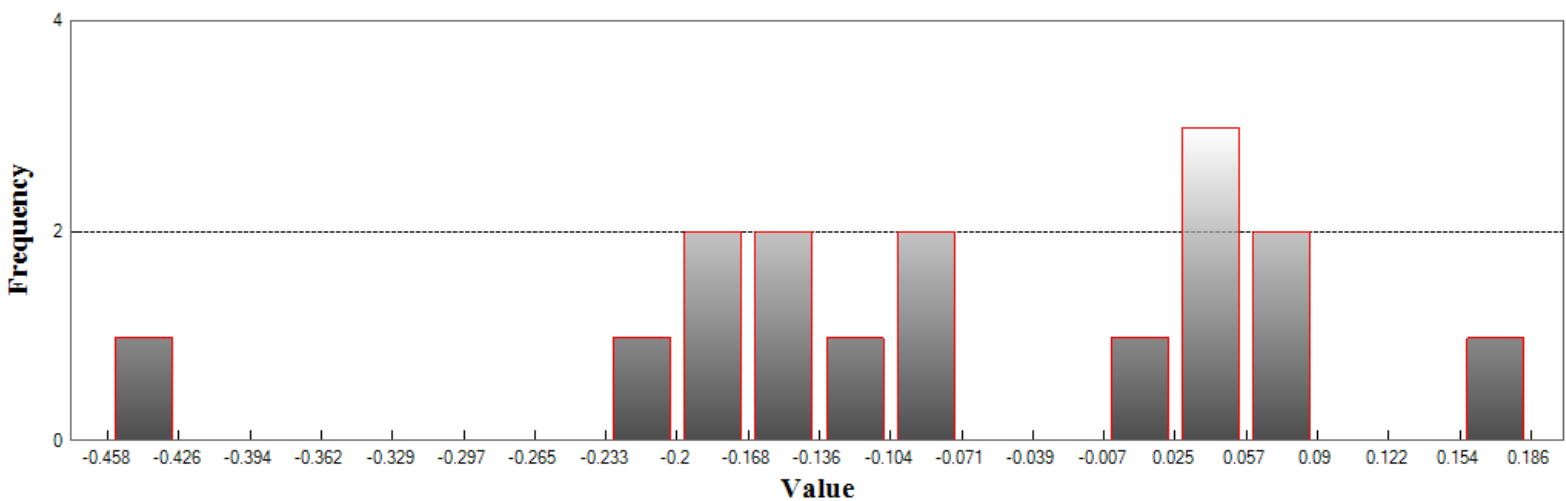


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.458  
Maximum DZ: 0.187  
Mean DZ: -0.075  
Mean Magnitude DZ: 0.363  
Number Observations: 16  
Standard Deviation DZ: 0.155  
RMSE Z: 0.168  
95th Percentile: 0.283  
Units: US Survey Feet

## Histogram



Min: -0.458

Max: 0.187

Number Of Bins: 20

Bin Interval: 0.032

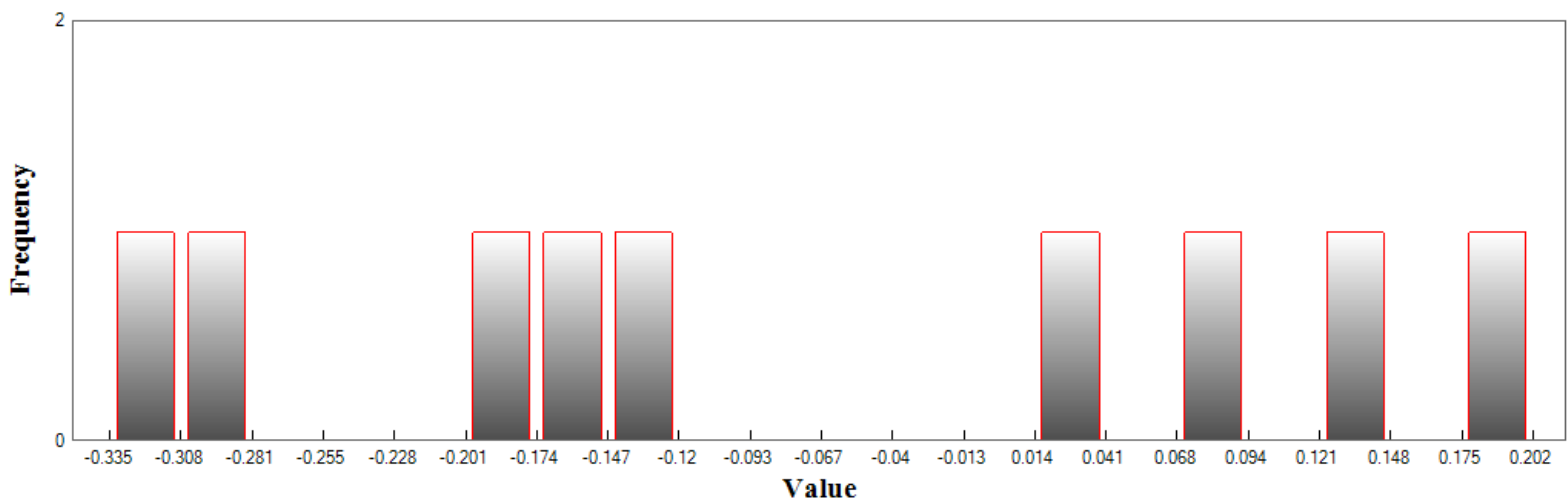


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.335  
Maximum DZ: 0.202  
Mean DZ: -0.074  
Mean Magnitude DZ: 0.415  
Number Observations: 9  
Standard Deviation DZ: 0.191  
RMSE Z: 0.195  
95th Percentile: 0.317  
Units: US Survey Feet

## Histogram



Min: -0.335

Max: 0.202

Number Of Bins: 20

Bin Interval: 0.027

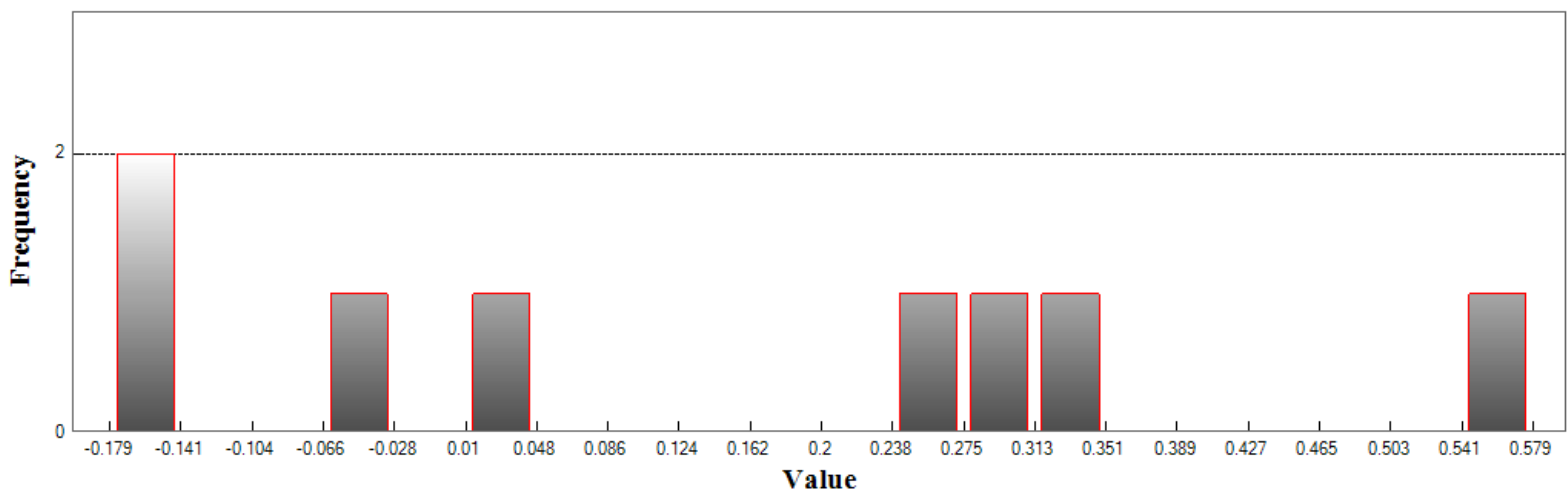


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: -0.179  
Maximum DZ: 0.579  
Mean DZ: 0.137  
Mean Magnitude DZ: 0.484  
Number Observations: 8  
Standard Deviation DZ: 0.269  
RMSE Z: 0.286  
95th Percentile: 0.486  
Units: US Survey Feet

## Histogram



Min: -0.179

Max: 0.579

Number Of Bins: 20

Bin Interval: 0.038



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2B, 2L, 2M

Minimum DZ: -0.458

Maximum DZ: 0.579

Mean DZ: -0.023

Mean Magnitude DZ: 0.409

Number Observations: 33

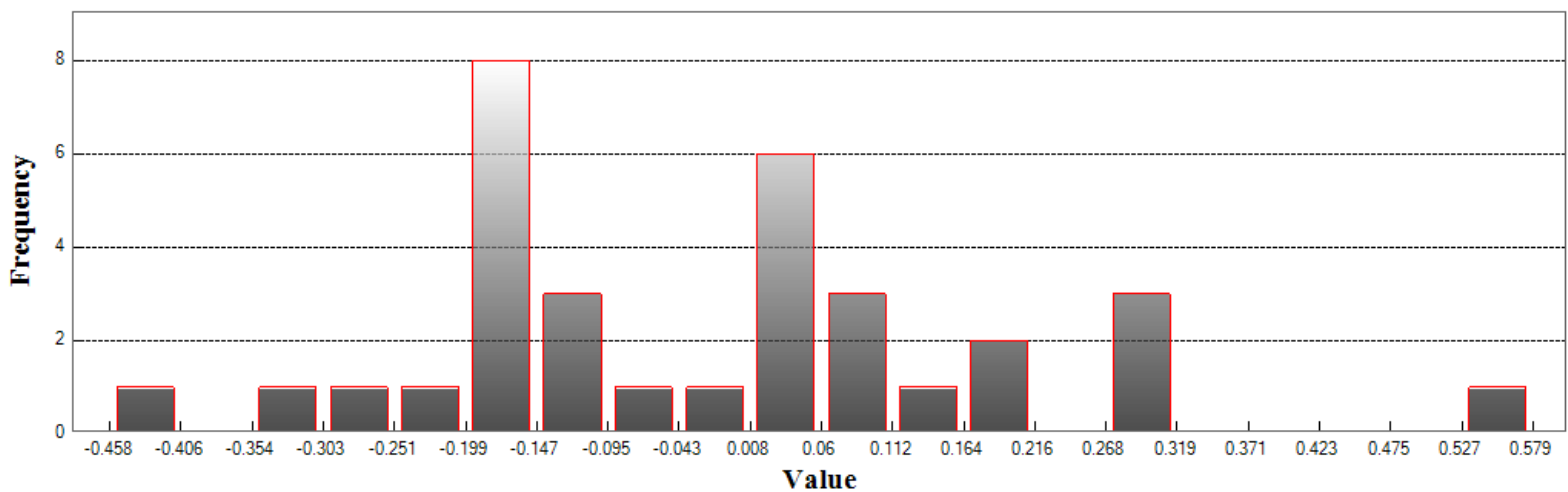
Standard Deviation DZ: 0.211

RMSE Z: 0.21

95th Percentile: 0.384

Units: US Survey Feet

## Histogram



Min: -0.458

Max: 0.579

Number Of Bins: 20

Bin Interval: 0.052



**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: Steve Kaufman  
Project Name: 2014 LiDAR QC  
Sensor Info: na  
Required Nominal Pulse Spacing: 0.7  
Vendor Name: ESP  
Units: US Survey Feet  
Percent of Extent Tolerance: Extents Not Checked  
Date of Aquisition: Start: 3/30/2015 Finish: 3/30/2015

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## Metadata Information

Tile Index:

Path: C:\Users\skaufman\Documents\Drawing Files\Current\LiDAR QC\2014 LiDAR\2014 Contractor LiDAR

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Path to Data: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

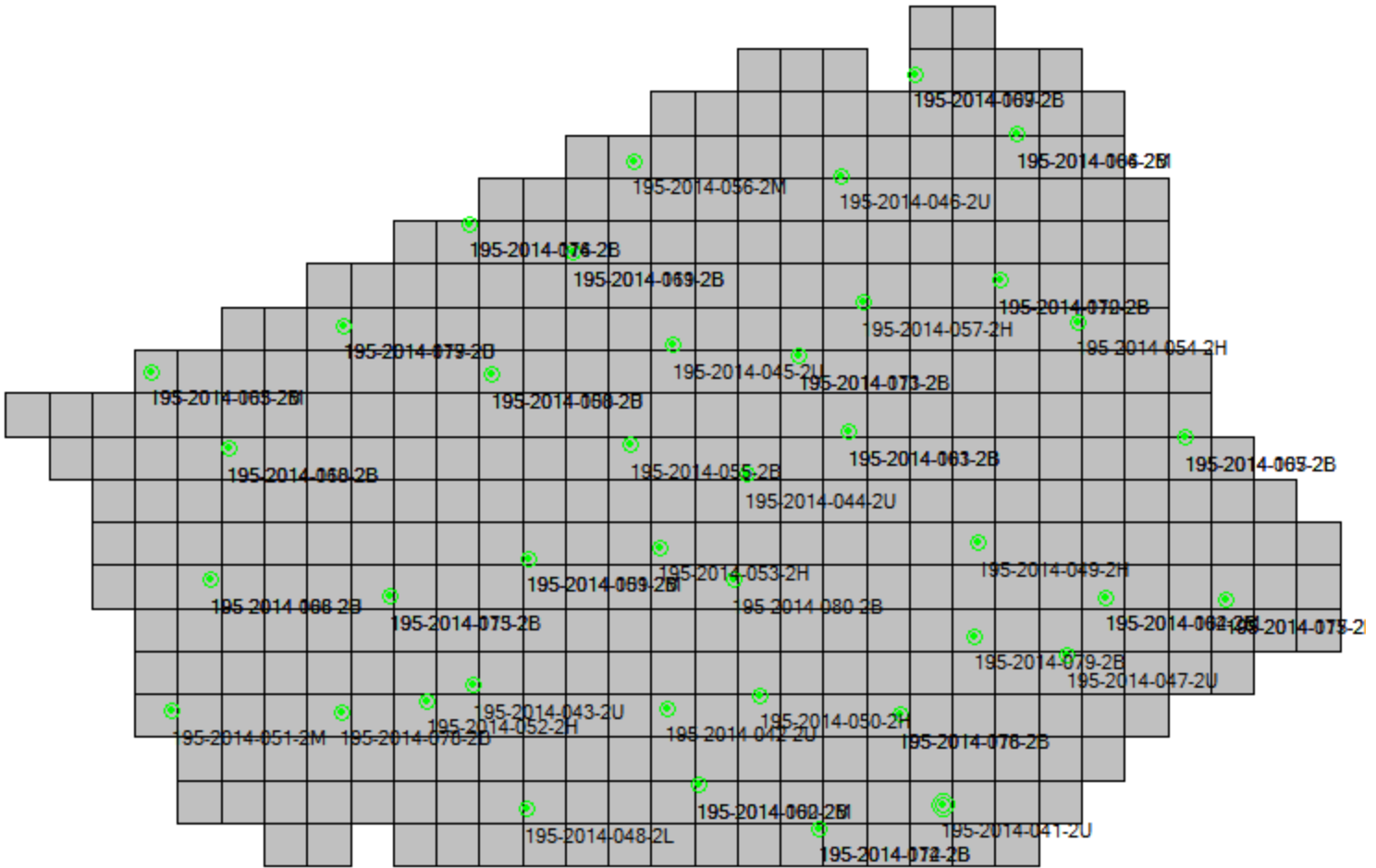
Tile Index Attribute: LiDARTiles

Path to Data: \\NCEMJFHQCLPSHP\FData\WilsonCoNC\Masspoints

Number of Data Files Matching Attribute: 414 out of 414



## Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	SVA	VVA
LAS				
ALL	60			
2U	10	0.314	0.245	
2L	7		0.379	0.379
2H	6		0.662	0.662
2M	7		0.864	0.864
2B	30	0.528	0.408	
Total	60			

Units: US Survey Feet

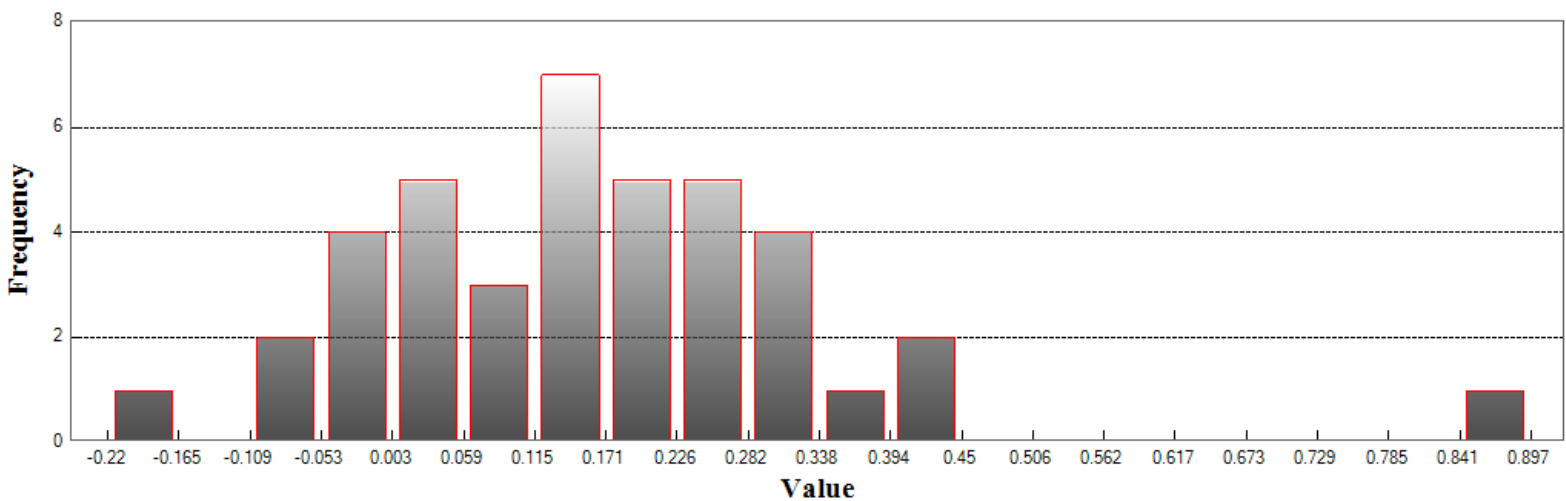


# LAS

## Non-vegetated Vertical Accuracy

LandCover Type: 2U, 2B  
Minimum DZ: -0.22  
Maximum DZ: 0.897  
Mean DZ: 0.166  
Mean Magnitude DZ: 0.433  
Number Observations: 40  
Standard Deviation DZ: 0.184  
RMSE Z: 0.247  
95% Confidence Level Z: 0.483  
Units: US Survey Feet

# Histogram



Min: -0.22  
Max: 0.897  
Number Of Bins: 20  
Bin Interval: 0.056

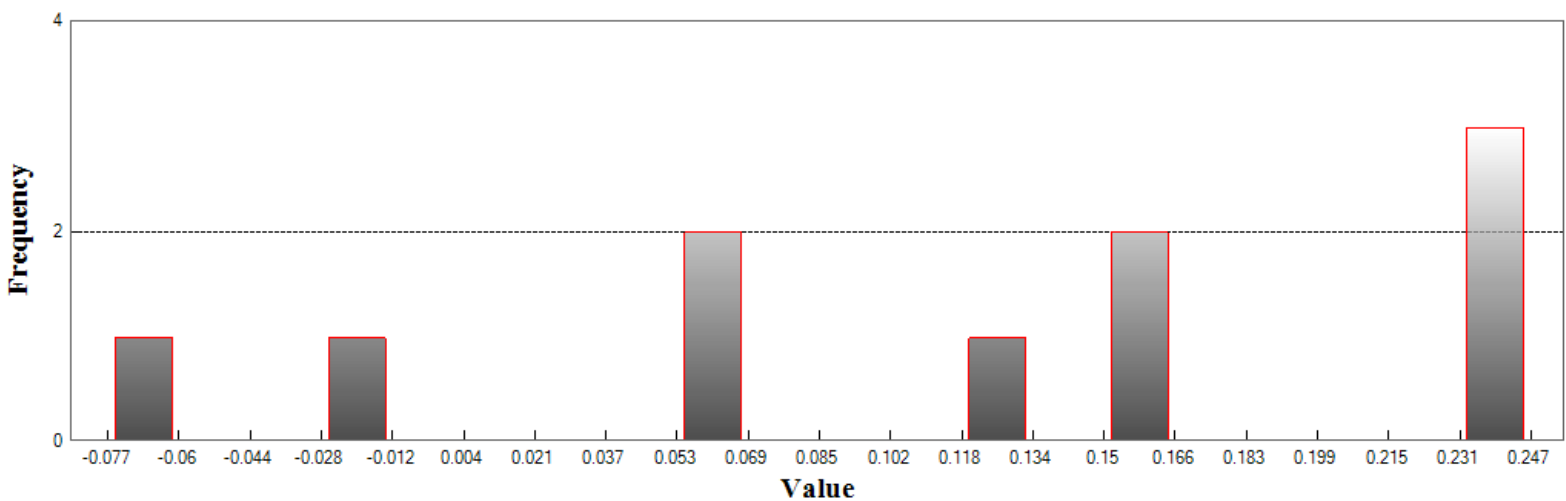


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2U  
Minimum DZ: -0.076  
Maximum DZ: 0.248  
Mean DZ: 0.12  
Mean Magnitude DZ: 0.373  
Number Observations: 10  
Standard Deviation DZ: 0.111  
RMSE Z: 0.16  
95th Percentile: 0.245  
Units: US Survey Feet

## Histogram



Min: -0.076

Max: 0.248

Number Of Bins: 20

Bin Interval: 0.016

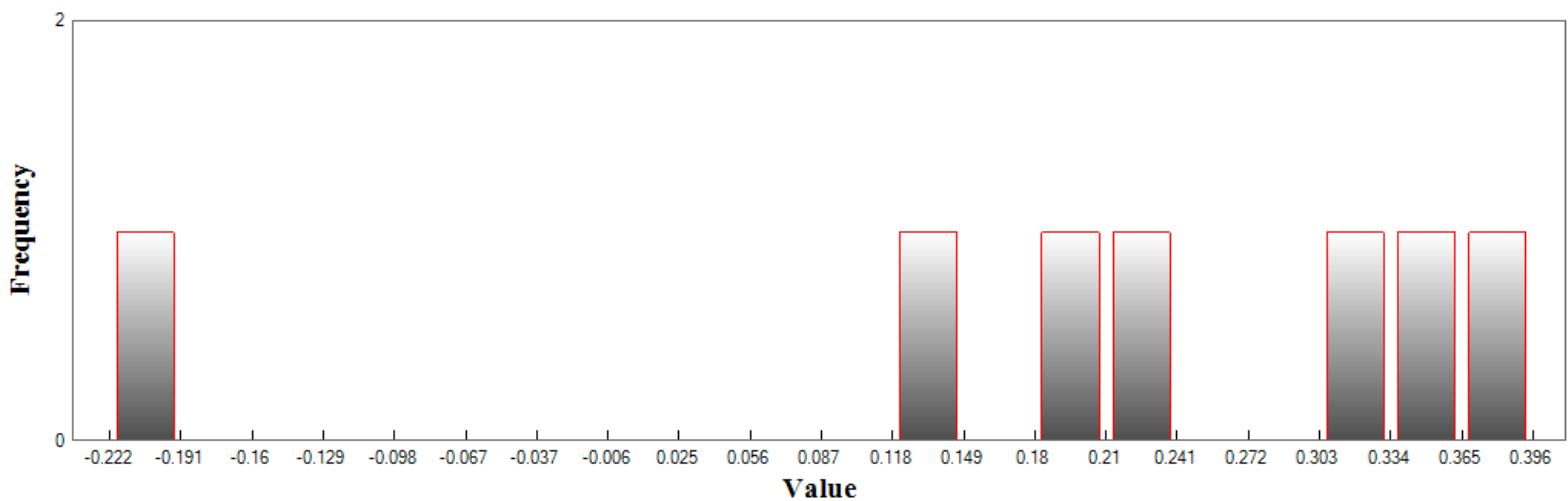


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2L  
Minimum DZ: -0.221  
Maximum DZ: 0.396  
Mean DZ: 0.202  
Mean Magnitude DZ: 0.515  
Number Observations: 7  
Standard Deviation DZ: 0.208  
RMSE Z: 0.279  
95th Percentile: 0.379  
Units: US Survey Feet

## Histogram



Min: -0.221

Max: 0.396

Number Of Bins: 20

Bin Interval: 0.031

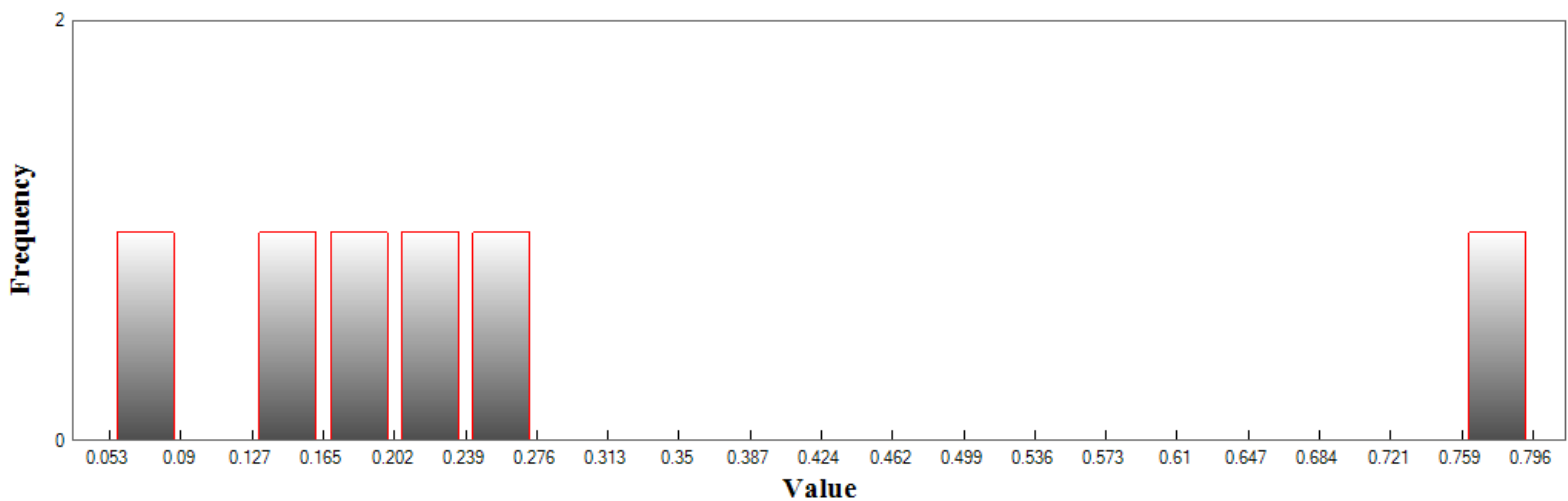


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2H  
Minimum DZ: 0.053  
Maximum DZ: 0.795  
Mean DZ: 0.276  
Mean Magnitude DZ: 0.525  
Number Observations: 6  
Standard Deviation DZ: 0.264  
RMSE Z: 0.366  
95th Percentile: 0.662  
Units: US Survey Feet

## Histogram



Min: 0.053

Max: 0.795

Number Of Bins: 20

Bin Interval: 0.037

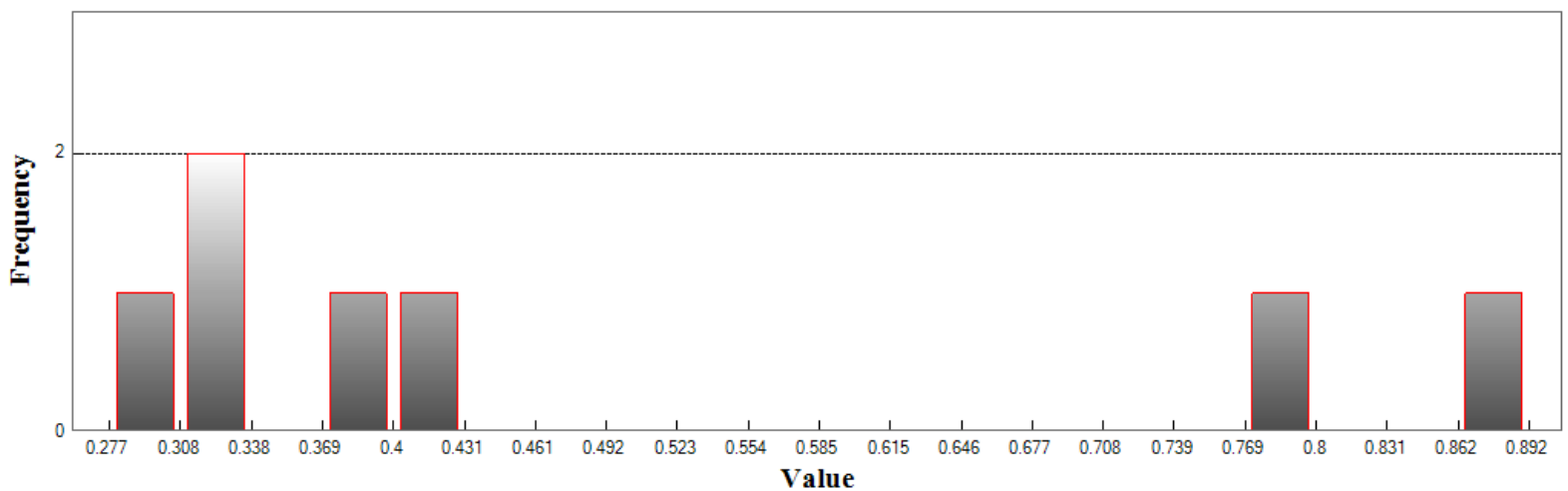


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2M  
Minimum DZ: 0.277  
Maximum DZ: 0.893  
Mean DZ: 0.487  
Mean Magnitude DZ: 0.698  
Number Observations: 7  
Standard Deviation DZ: 0.249  
RMSE Z: 0.539  
95th Percentile: 0.864  
Units: US Survey Feet

## Histogram



Min: 0.277

Max: 0.893

Number Of Bins: 20

Bin Interval: 0.031



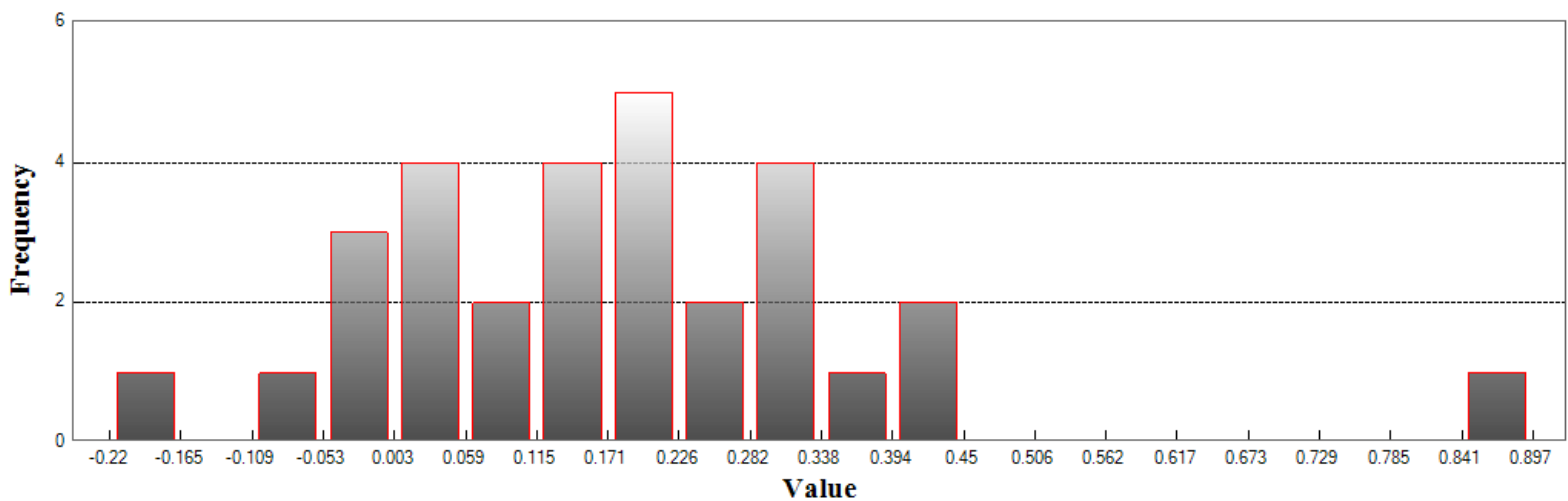


## LAS (Continued)

### Supplemental Vertical Accuracy

LandCover Type: 2B  
Minimum DZ: -0.22  
Maximum DZ: 0.897  
Mean DZ: 0.182  
Mean Magnitude DZ: 0.452  
Number Observations: 30  
Standard Deviation DZ: 0.202  
RMSE Z: 0.269  
95th Percentile: 0.408  
Units: US Survey Feet

## Histogram



Min: -0.22

Max: 0.897

Number Of Bins: 20

Bin Interval: 0.056



## LAS (Continued)

### Vegetated Vertical Accuracy

LandCover Type: 2L, 2H, 2M

Minimum DZ: -0.221

Maximum DZ: 0.893

Mean DZ: 0.324

Mean Magnitude DZ: 0.588

Number Observations: 20

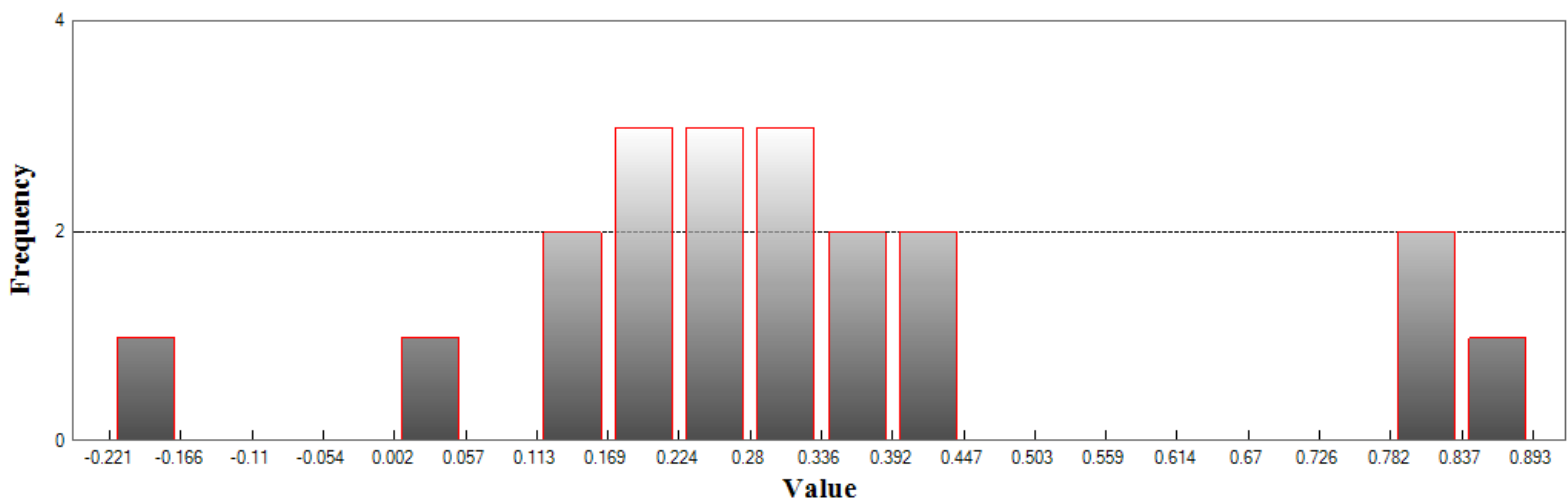
Standard Deviation DZ: 0.26

RMSE Z: 0.411

95th Percentile: 0.801

Units: US Survey Feet

## Histogram



Min: -0.221

Max: 0.893

Number Of Bins: 20

Bin Interval: 0.056