GROUND CONTROL SURVEY REPORT

GROUND TRUTH SURVEY
FOR LIDAR CONTROL

Professional Management
and LiDAR Data Collection
and Processing Services

Block 10

PROJECT TITLE:	Professional Management and LiDAR Data Collection and Processing Services
WORK ORDER NAME:	Task Order A
WORK ORDER NUMBER:	2007058492720
CONSULTANT NAME:	3001, Inc., CH2M Hill, Inc.
PROJECT MANAGERS:	Jeremy Conner, 3001 Project Manager JoLee Gardner, CH2M Hill Project Manager

Services provided by:

3001, INC. THE GEOSPATIAL COMPANY
501 Robert Blvd. 2nd Floor
Slidell, Louisiana 70458

May 2008

Florida Division of Emergency Management
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

Re: Professional Management and LiDAR Data Collection and Processing Services, Block 10

This photogrammetric mapping ground control survey is certified as meeting or exceeding, in quality and precision, the standards applicable for this work as set forth in Chapter 61G17-6, Florida Adminstrative Code.

Dean T. Epling, PSM
Florida Professional Surveyor and Mapper
License # 5417
401 Dividend Drive, Suite K
Peachtree City, GA 30269
(770) 631-0903

Signed:_____Date:_____

CONTENTS

ABSTRACT

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This report documents the GPS ground surveys conducted in support of LIDAR data collection for the Professional Management and LiDAR Data Collection and Processing Services project, Block 10. The data was collected between December 4 and December 10, 2007. The ground control stations were established utilizing four Trimble 4000 series receivers, one Trimble 4700 GPS receivers, four Trimble Compact L1/L2 antennas with ground plane, and one Trimble microcentered L1/L2 antenna without ground plane. There were no problems encountered during this survey.

Following the control network surveys, surveys were conducted at 2 sites utilizing a total station and a data collector. This survey established “Ground Truth” data at on different surface types, including bare-earth / low grass, brush lands / low trees, and urban areas.

In Blocks 9 and 10, there was an approved deviation from the required accuracy in the Baseline Specifications. The deviation extended the GPS base station spacing for LiDAR gathering from 20 miles to 30 miles. It was approved by Richard Butgereit on an email to JoLee Gardner on February 4, 2008.

SURVEY METHODOLOGY

SURVEY METHODOLOGY

Prior to beginning the survey collection, a reconnaissance was done of the existing control in the project area, and surrounding areas. Based on the results of the findings, the controls to be included in the network were selected based on their locations, horizontal and vertical orders, and their accessibility. In addition to the survey control, several Continuously Operating Reference Stations (CORS) were included into the GPS network. All control monuments and CORS can be found in the Fully-Constrained Adjustment table, found in Section 4-B, and can also be seen on the GPS Network Map shown in Section 4-A.

The GPS network was then planned to coincide with the following set of standards:

- FGCC, GEOMETRIC GEODETIC ACCURACY STANDARDS AND SPECIFICATIONS FOR USING GPS RELATIVE POSITIONING TECHNIQUES, VERSION 5.0, AUGUST 1989
- NGS-58, GUIDELINES FOR ESTABLISHING GPS-DERIVED ELLIPSOID HEIGHTS (2CM AND 5CM)
- NGS-59, GUIDELINES FOR ESTABLISHING GPS-DERIVED ORTHOMETRIC HEIGHTS (2CM AND 5CM)
- FGCC STANDARDS AND SPECIFICATIONS FOR GEODETIC CONTROL NETWORKS, 1984
- FEMA FLOOD HAZARD MAPPING PROGRAM, GUIDELINES AND SPECIFICATIONS FOR FLOOD HAZARD MAPPING PARTNERS, APPENDIX A

Control monuments were tied together with a four hour occupation. These monuments were then tied to newly established monuments, or secondary control monuments, with multiple one hour occupations.

After the static GPS network was completed, the ground truth data points were collected using a total station and data collector. This data was collected from base stations tied into the static GPS network, and additional “check-in” points were collected and compared to positions established in the static network. The ground truth data was then processed and used to verify the LIDAR positions.

The horizontal and vertical datums used for this project are listed below:

Coordinate System: US State Plane
Zone: Florida East 0901
Horizontal Datum: NAD83 (1999) / HARN Adjustment
Vertical Datum: NAVD88
Geoid Model: Geoid03
Units: US Survey Feet

MAIN REPORT

STATIC GPS SUMMARY

The Standard Operating Procedure for the data collection includes a geodetic control network plan designed to maximize the use of the highest order control points in the area of interest, and to optimize the spatial distribution of geodetic control across the network. Also included is the simultaneous occupation of points designed to provide redundant vectors and loop closures, as well as a collection of a superfluity of points to compare observed values against published values of geodetic control points.

In addition, the static GPS network was established to verify the compatibility and correlation of existing published NGS controls in the project area. Horizontal and vertical constraints were selected based on the order of accuracy and correlation of the controls selected.

PRELIMINARY ANALYSIS

The baselines were processed using Trimble Geomatics Offices's baseline processing module, WAVE (*Weighted Ambiguity Vector Estimator*). Ionosphere-free fixed solutions were found to provide the best results. Preliminary blunder detections were undertaken using "Redundant Vectors" and Global Network Closures and any extremely large errors were eliminated.

MINIMALLY CONSTRAINED ADJUSTMENT

The data are then processed using a minimally constrained geodetic control network to test the network internally, without external constraints, and produce a statistical summary. The statistics from this process are required to be within the tolerance outlined in the Geometric Geodetic Accuracy Standards and Specifications for using GPS Relative Positioning Techniques, published by the FGCC. These tolerances are represented as ellipsoids showing the margin of error value on a graph of the theoretical points, covariance values that indicate the degree of error of the vectors relative to the other vectors in the network, and a chi-squared test that compares the predicted variance determined through a least-squares analysis to the observed variance. The summary is evaluated to eliminate vectors that are outside of the error tolerances to be replaced with redundant vectors that are within the tolerances until all tolerances are met.

FULLY CONSTRAINED ADJUSTMENT

The quality of the existing horizontal controls is assessed before undertaking the constrained adjustment. Geodetic inverses between the published NAD83 (1999) coordinates of existing stations were compared with the geodetic inverses derived from the minimally constrained least square adjustment results. This distance analysis is especially useful, since it provides a datum invariant means of comparison.

Once the minimally constrained network satisfies the requirements of the above tests, the highest order control points in the control network are selected with an optimum

spatial relationship to fully constrain the network to known control points, and have their published values entered as the position for those points and the network re-adjusted. The fully constrained positions are given in Section 4-B. The same statistical tests are rerun on the adjusted network, as well as visually comparing adjusted values of geodetic control points to published values of control points not used as constraints. Again, the summary is evaluated to identify vectors outside of the tolerances and constraining points reselected to obtain the best fit to the geoid where all vectors are within the prescribed tolerances.

ERROR ELLIPSES

The adjustment results show that the a posteriori variance factor of the network was close to 1.0, as should be desired, and passed the χ^2 test. None of the residual components in the network were flagged for possible rejection under the τ-max test at the 0.05 level of significance. The relative confidence ellipses reveal that the horizontal positional accuracy between all directly connected pairs of stations in the network were better than (1:100,000) at the 95% level of confidence. The horizontal and vertical Error ellipses are included in this report in Section 4-D.

GROUND TRUTH SUMMARY

Surveys were conducted to establish ground truth data at representative sites throughout the project area. These sites were selected on the basis of the various types of ground surfaces and vegetation covers that would be encountered by the LIDAR surveys. As a quality control measure, a number of “check-in” points consisted of published horizontal and vertical control points within the area. The base stations used to collect survey data were included in the static GPS network, and were selected on the basis of their having an unobstructed view of the sky, as well as being in a location considered favorable for collecting ground truth data. The vertical and horizontal accuracy of each base station was determined by the statistical tests performed in the least squares adjustment process.

SAMPLE POINTS / TEST POINTS

The test points were distributed and categorized into sites as shown in the Map of Ground Truth Locations attached in this report (Section 5-A). These sites were selected on the basis of various types of ground surfaces and vegetation covers. At the time of LIDAR data acquisition, checkpoints were collected on surfaces with bare-earth / low grass, brush lands / low trees, and urban areas.

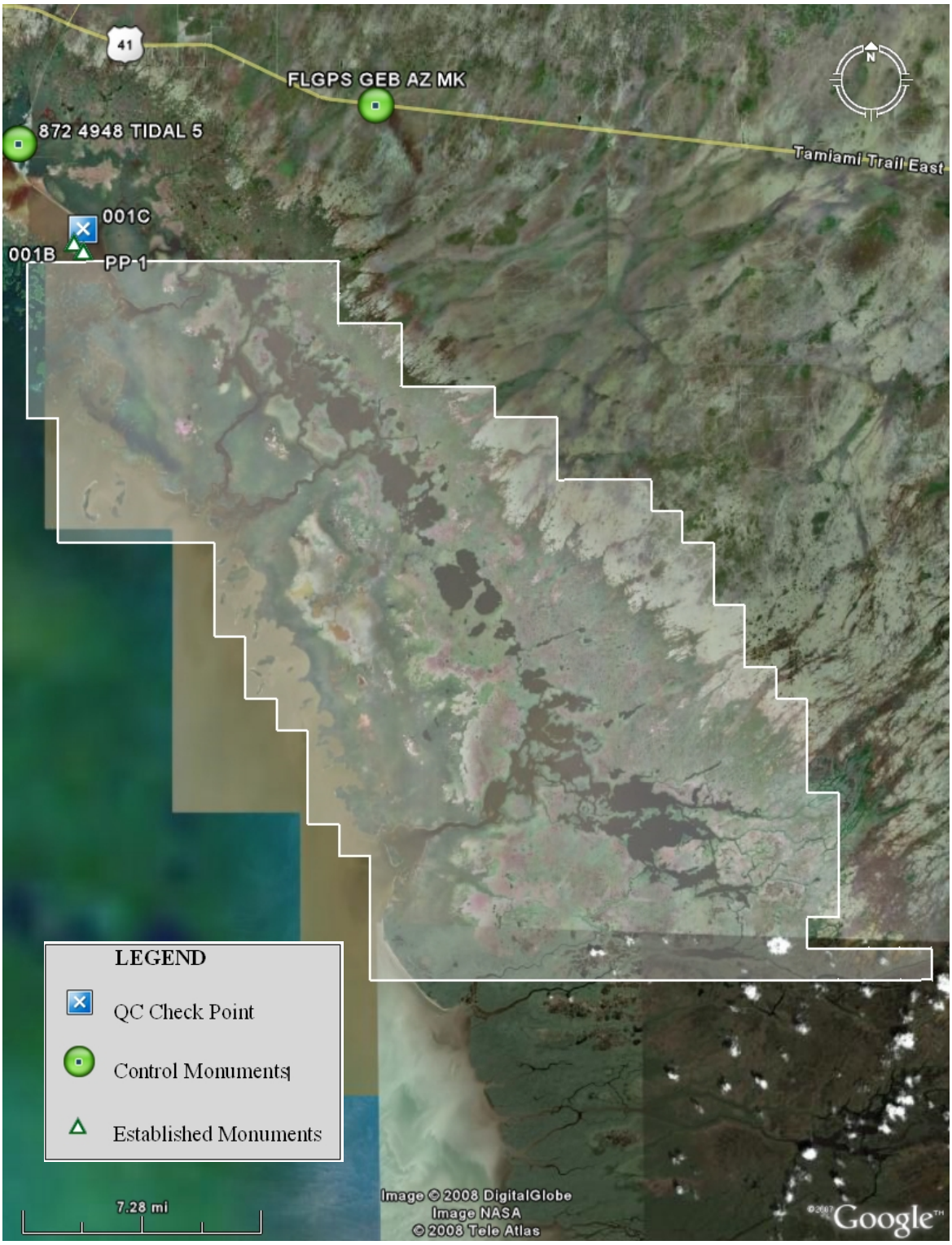
GPS NETWORK

A. GPS Network Map

GPS Network Map

This map shows the GPS baselines processed for this network. The CORS and control monuments can be distinguished from the newly established monuments (see the legend above).

QC Check Points



The QC check points can be seen in the above map. The QC procedures are described in Section 3, in the Ground Truth Summary. The individual check sites can be seen in detail in Section 5-B.

B. Fully Constrained

GPS Control Network
Fully-Constrained Adjustment

Coordinate System: US State Plane
Zone: Florida East 0901
Horizontal Datum: NAD83 (1999)
HARN Adjustment
Vertical Datum: NAVD88
Geoid Model: Geoid03
Units: US Survey Feet

Name	Latitude	Longitude	Northing	Easting	Elev	Ellip Ht	Northing error	Easting error	Ellip error	Fix
KWST	24 33 13.26749	81 45 15.40020	80757.09	405464.64	38.03	-33.35	0.00	0.00	0.00	LLh
MTNT	25 51 56.76081	80 54 25.18701	556914.06	686748.36	17.53	-62.15	0.00	0.00	0.00	LLh
NAPL	26 08 55.10356	81 46 34.62742	660475.38	401512.49	19.92	-57.21	0.00	0.00	0.00	LLh
RMND	25 36 49.58921	80 23 02.14117	465790.41	859175.16	35.96	-46.22	0.00	0.00	0.00	LLh
FLGPS GEB AZ MK	25 52 29.65921	81 12 48.95553	560281.72	585935.87	3.46	-75.34	0.00	0.00	0.00	LLh
872 4948 TIDAL 5	25 51 26.92455	81 23 18.39911	554079.87	528427.92	3.35	-73.98	0.00	0.01	0.02	
001B	25 48 53.00437	81 21 37.51477	538514.00	537600.82	3.39	-73.79	0.00	0.00	0.01	
001C	25 48 52.55724	81 21 34.06190	538468.00	537916.22	2.68	-74.51	0.01	0.01	0.02	
PP 1	25 48 43.27800	81 21 33.12836	537530.95	537998.97	5.57	-71.60	0.00	0.00	0.01	

ERRORS ARE REPORTED AT THE 95% CONFIDENCE LEVEL.

C. NGS Published Positions vs GPS Derived Positions

NGS Positions vs GPS Derived Positions

Coordinate System: US State Plane
Zone: Florida East 0901
Horizontal Datum: NAD83 (1999)
Vertical Datum: NAVD88
Geoid Model: Geoid03
Units: US Survey Feet

NGS Positions

Name	Northing	Easting	Elev	Ellip Ht	Horiz Order	Vert Order	Ellip Order
kwst	80757.09	405464.64		-33.35	CORS	CORS	CORS
mtnt	556914.05	686748.36		-62.15	CORS	CORS	CORS
napl	660475.38	401512.49	20.01	-57.21	CORS	CORS	CORS
rmnd	465790.41	859175.16		-46.22	CORS	CORS	CORS
GEBA	560281.72	585935.87	3.51	-75.34		1	
TID5	554079.87	528427.83	3.5	-73.87		1	

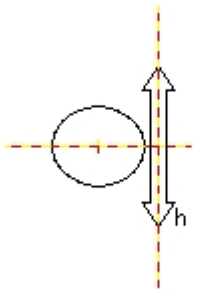
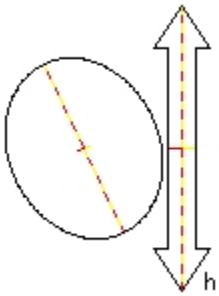
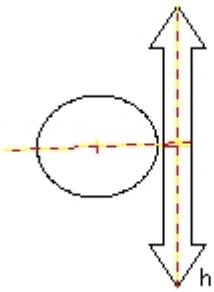
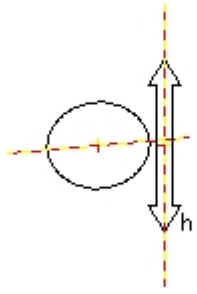
GPS Derived Positions

Northing	Easting	Elev	Ellip Ht
80757.09	405464.64	38.03	-33.35
556914.06	686748.36	17.53	-62.15
660475.38	401512.49	19.92	-57.21
465790.41	859175.16	35.96	-46.22
560281.72	585935.87	3.46	-75.34
554079.87	528427.92	3.35	-73.98

delta Northing	delta Easting	delta Elev	delta Ellip
0.00	0.00		0.00
0.00	0.00		0.00
0.00	0.00	0.09	0.00
0.00	0.00		0.00
0.00	0.00	0.05	0.00
0.00	-0.09	0.11	0.11

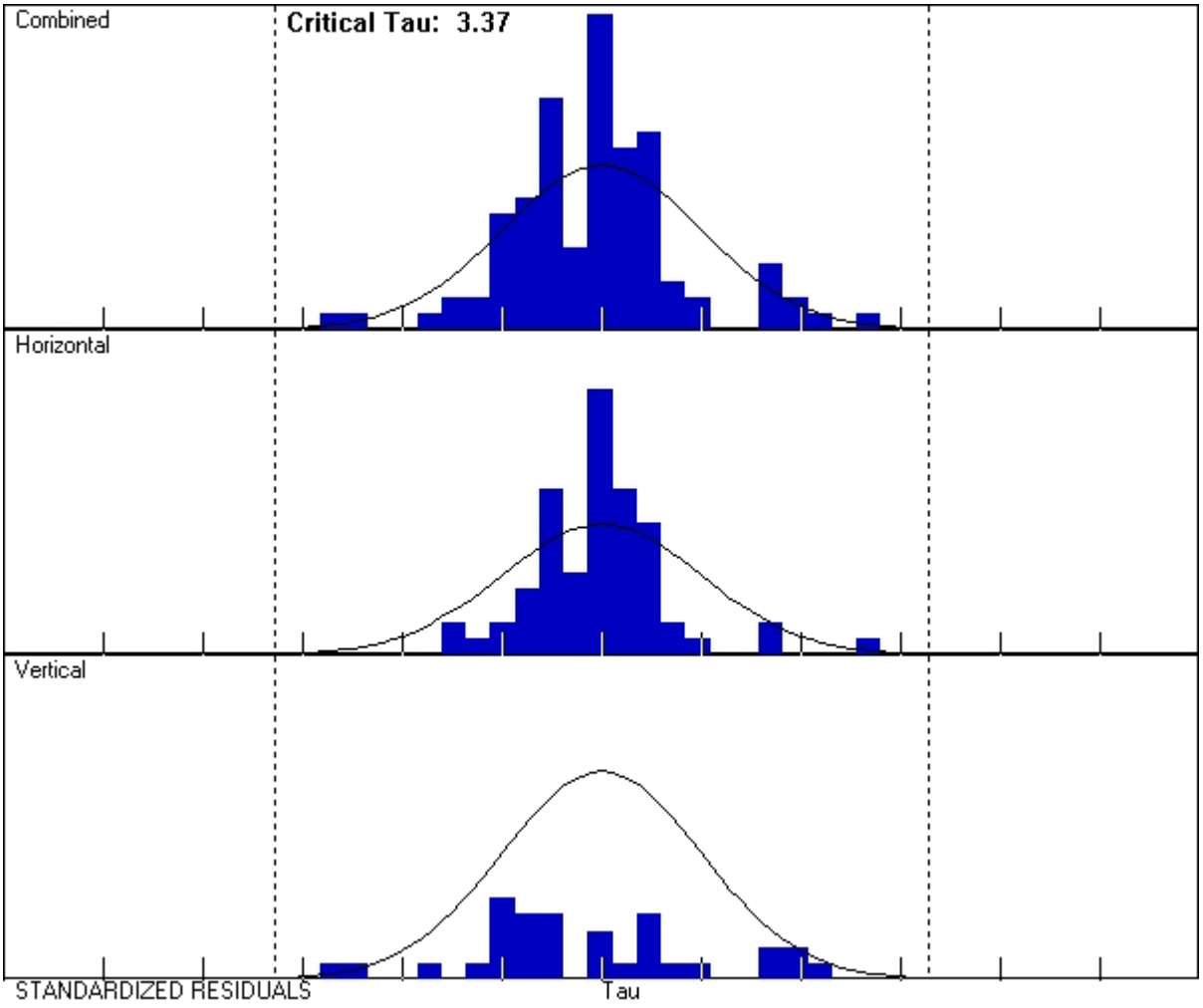
D. Error Ellipses

Point Error Ellipses

001B	001C	TID5
		
Tick Size: 0.0010m Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ		
PP 1		
		
Tick Size: 0.0010m Horizontal Bivariate Scalar: 2.45σ Vertical Univariate Scalar: 1.96σ		

E. Histograms of Standardized Residuals

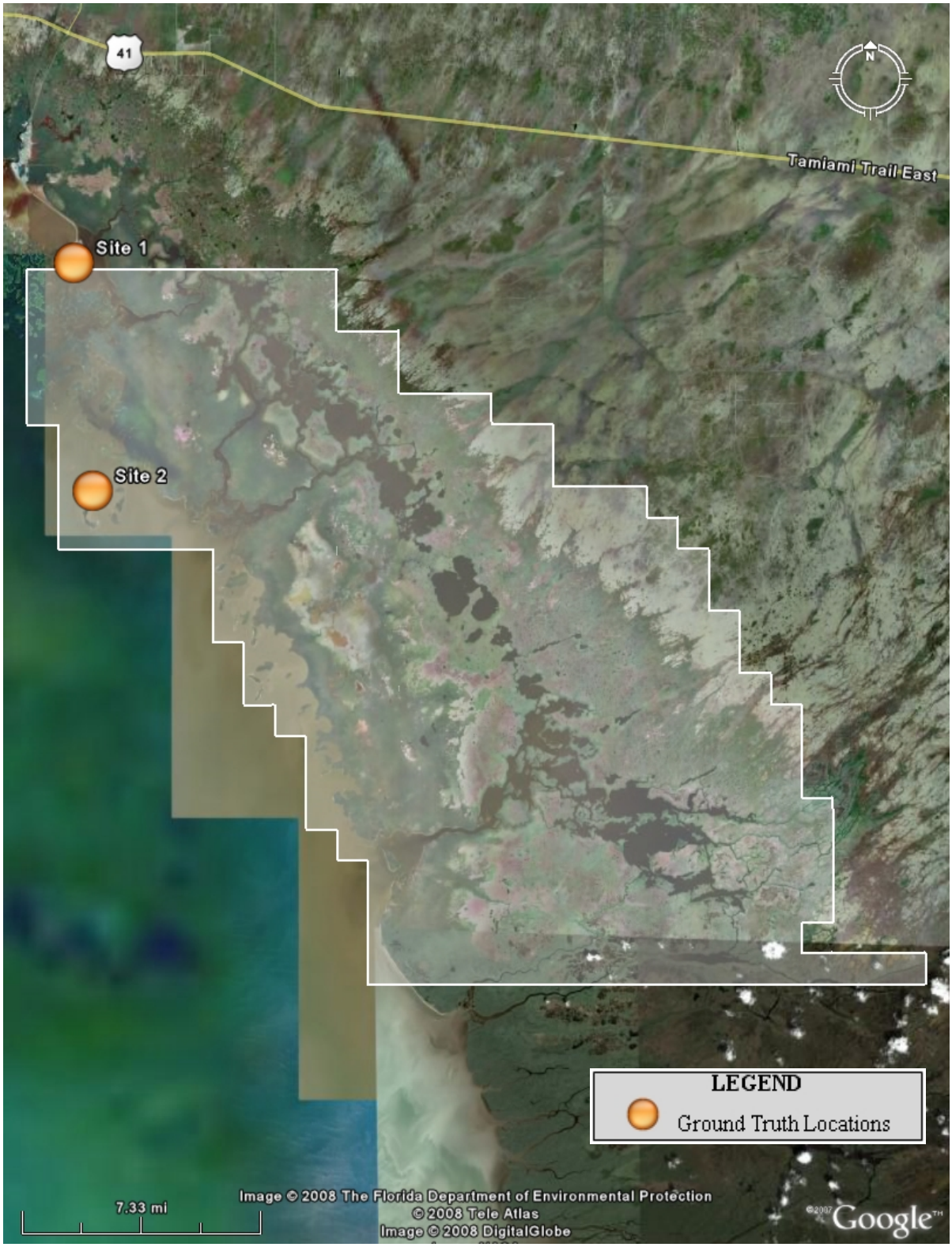
Histograms of Standardized Residuals



GROUND TRUTH SURVEY

A. Map of Ground Truth Locations

Ground Truth Locations

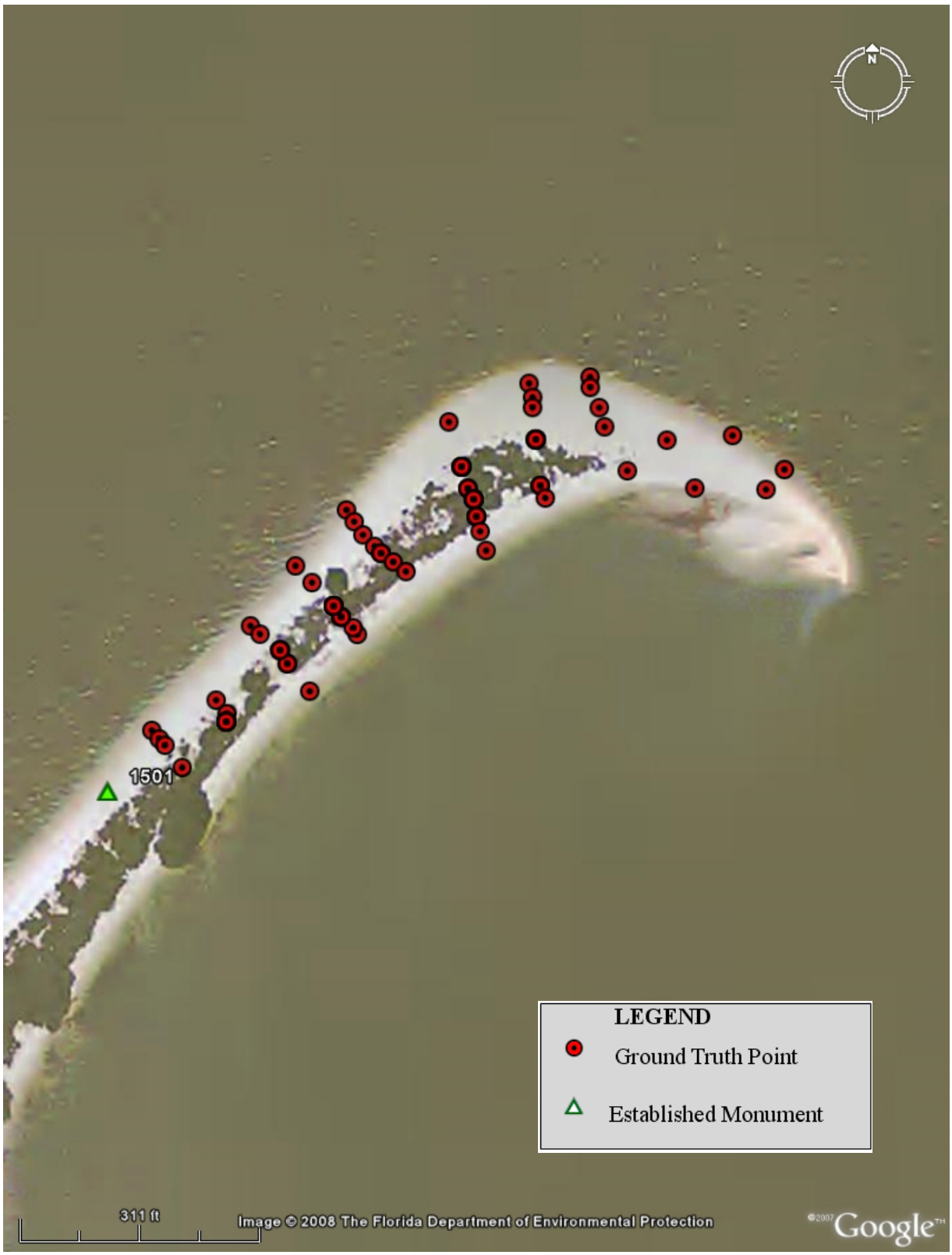


The individual check sites can be seen in detail on the following pages.

B. Ground Truth Site Maps

SITE 1 - Ground Truth Points

SITE 2 - Ground Truth Points



C. Horizontal Accuracy Assessment

HORIZONTAL ACCURACY CHECK POINTS

Horizontal check points were collected in order to verify the horizontal accuracy of the LiDAR data. When the horizontal check points were plotted and compared to the LiDAR data, they could not be identified.

CONTROL MARK DATA SHEETS

```
DE9146 ***********************************************************************
DE9146  CORS       -  This is a GPS Continuously Operating Reference Station.
DE9146  DESIGNATION -  KEY WEST CORS ARP
DE9146  CORS_ID    -  KWST
DE9146  PID        -  DE9146
DE9146  STATE/COUNTY-  FL/MONROE
DE9146  USGS QUAD   -  KEY WEST (1971)
DE9146
DE9146                    *CURRENT SURVEY CONTROL
DE9146 _____________________________________________________________________
DE9146* NAD 83(CORS)-  24 33 13.26749(N)    081 45 15.40020(W)     ADJUSTED
DE9146* NAVD 88     -
DE9146 _____________________________________________________________________
DE9146  EPOCH DATE  -       2002.00
DE9146  X           -     832,506.096 (meters)                  COMP
DE9146  Y           -  -5,744,714.917 (meters)                  COMP
DE9146  Z           -   2,634,183.202 (meters)                  COMP
DE9146  ELLIP HEIGHT-         -10.164 (meters)          (12/??/02) ADJUSTED
DE9146  GEOID HEIGHT-         -21.75  (meters)                  GEOID03
DE9146  HORZ ORDER  -  SPECIAL (CORS)
DE9146  ELLP ORDER  -  SPECIAL (CORS)
DE9146
DE9146.ITRF positions are available for this station.
DE9146.The coordinates were established by GPS observations
DE9146.and adjusted by the National Geodetic Survey in December 2002.
DE9146.The coordinates are valid at the epoch date displayed above.
DE9146.The epoch date for horizontal control is a decimal equivalence
DE9146.of Year/Month/Day.
DE9146
DE9146
DE9146.The PID for the CORS L1 Phase Center is DE9147.
DE9146
DE9146.The XYZ, and position/ellipsoidal ht. are equivalent.
DE9146
DE9146.The ellipsoidal height was determined by GPS observations
DE9146.and is referenced to NAD 83.
DE9146
DE9146.The geoid height was determined by GEOID03.
DE9146
DE9146;                 North         East      Units Scale Factor Converg.
DE9146;SPC FL E     -    24,614.810   123,585.870   MT  1.00001327   -0 18 48.4
DE9146;SPC FL E     -    80,757.09    405,464.64   sFT  1.00001327   -0 18 48.4
DE9146
DE9146!           - Elev Factor  x  Scale Factor =   Combined Factor
DE9146!SPC FL E     -  1.00000160  x   1.00001327  =   1.00001487
DE9146
DE9146                     SUPERSEDED SURVEY CONTROL
DE9146
DE9146.No superseded survey control is available for this station.
DE9146
DE9146_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RMH2361215738(NAD 83)
DE9146_MARKER: STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA
DE9146
DE9146                     STATION DESCRIPTION
DE9146
DE9146'DESCRIBED BY NATIONAL GEODETIC SURVEY 2002
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DE9146'STATION IS A GPS CORS. LATEST INFORMATION INCLUDING POSITIONS AND
DE9146'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
DE9146'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
DE9146'   FTP CORS.NGS.NOAA.GOV: CORS/COORD AND CORS/STATION_LOG
DE9146'   HTTP://WWW.NGS.NOAA.GOV UNDER PRODUCTS AND SERVICES.

```
DF7050 ************************************************************************
DF7050  CORS        -  This is a GPS Continuously Operating Reference Station.
DF7050  DESIGNATION -  MIAMI TNT CORS ARP
DF7050  CORS_ID     -  MTNT
DF7050  PID         -  DF7050
DF7050  STATE/COUNTY-  FL/COLLIER
DF7050  USGS QUAD   -  FIFTYMILE BEND (1995)
DF7050
DF7050                    *CURRENT SURVEY CONTROL
DF7050 ______________________________________________________________________
DF7050* NAD 83(CORS)-  25 51 56.76081(N)    080 54 25.18701(W)     ADJUSTED
DF7050* NAVD 88     -
DF7050 ______________________________________________________________________
DF7050  EPOCH DATE  -        2002.00
DF7050  X           -     907,579.127 (meters)                 COMP
DF7050  Y           -  -5,670,639.703 (meters)                 COMP
DF7050  Z           -   2,765,679.841 (meters)                 COMP
DF7050  ELLIP HEIGHT-         -18.942 (meters)          (08/??/03) ADJUSTED
DF7050  GEOID HEIGHT-         -24.29  (meters)                 GEOID03
DF7050  HORZ ORDER  -  SPECIAL (CORS)
DF7050  ELLP ORDER  -  SPECIAL (CORS)
DF7050
DF7050.ITRF positions are available for this station.
DF7050.The coordinates were established by GPS observations
DF7050.and adjusted by the National Geodetic Survey in August 2003.
DF7050.The coordinates are valid at the epoch date displayed above.
DF7050.The epoch date for horizontal control is a decimal equivalence
DF7050.of Year/Month/Day.
DF7050
DF7050
DF7050.The PID for the CORS L1 Phase Center is DF7051.
DF7050
DF7050.The XYZ, and position/ellipsoidal ht. are equivalent.
DF7050
DF7050.The ellipsoidal height was determined by GPS observations
DF7050.and is referenced to NAD 83.
DF7050
DF7050.The geoid height was determined by GEOID03.
DF7050
DF7050;                 North         East      Units Scale Factor Converg.
DF7050;SPC FL E     -   169,747.743   209,321.320   MT  0.99994225   +0 02 26.1
DF7050;SPC FL E     -   556,914.05    686,748.36    sFT  0.99994225   +0 02 26.1
DF7050
DF7050!           -  Elev Factor  x  Scale Factor =   Combined Factor
DF7050!SPC FL E     -  1.00000298  x   0.99994225  =   0.99994523
DF7050
DF7050                    SUPERSEDED SURVEY CONTROL
DF7050
DF7050.No superseded survey control is available for this station.
DF7050
DF7050_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RNJ0931860822(NAD 83)
DF7050_MARKER: STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA
DF7050
DF7050                    STATION DESCRIPTION
DF7050
DF7050'DESCRIBED BY NATIONAL GEODETIC SURVEY 2003
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DF7050'STATION IS A GPS CORS. LATEST INFORMATION INCLUDING POSITIONS AND
DF7050'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
DF7050'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
DF7050'   FTP CORS.NGS.NOAA.GOV: CORS/COORD AND CORS/STATION_LOG
DF7050'   HTTP://WWW.NGS.NOAA.GOV UNDER PRODUCTS AND SERVICES.

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 DF7052 ***********************************************************************
DF7052  CORS        -  This is a GPS Continuously Operating Reference Station.
DF7052  DESIGNATION -  NAPLES CORS ARP
DF7052  CORS_ID     -  NAPL
DF7052  PID         -  DF7052
DF7052  STATE/COUNTY-  FL/COLLIER
DF7052  USGS QUAD   -  NAPLES NORTH (1987)
DF7052
DF7052                    *CURRENT SURVEY CONTROL
DF7052  ______________________________________________________________________
DF7052* NAD 83(CORS)-  26 08 55.10356(N)    081 46 34.62742(W)     ADJUSTED
DF7052* NAVD 88     -        6.1    (meters)      20.     (feet)  GPS OBS
DF7052  ______________________________________________________________________
DF7052  EPOCH DATE  -        2002.00
DF7052  X           -     819,477.897 (meters)                  COMP
DF7052  Y           -  -5,670,157.335 (meters)                  COMP
DF7052  Z           -   2,793,845.936 (meters)                  COMP
DF7052  ELLIP HEIGHT-         -17.439 (meters)          (08/??/03) ADJUSTED
DF7052  GEOID HEIGHT-         -23.51  (meters)                  GEOID03
DF7052  HORZ ORDER  -  SPECIAL (CORS)
DF7052  ELLP ORDER  -  SPECIAL (CORS)
DF7052
DF7052.ITRF positions are available for this station.
DF7052.The coordinates were established by GPS observations
DF7052.and adjusted by the National Geodetic Survey in August 2003.
DF7052.The coordinates are valid at the epoch date displayed above.
DF7052.The epoch date for horizontal control is a decimal equivalence
DF7052.of Year/Month/Day.
DF7052
DF7052.The orthometric height was determined by GPS observations and a
DF7052.high-resolution geoid model.
DF7052
DF7052.The PID for the CORS L1 Phase Center is DF7053.
DF7052
DF7052.The XYZ, and position/ellipsoidal ht. are equivalent.
DF7052
DF7052.The ellipsoidal height was determined by GPS observations
DF7052.and is referenced to NAD 83.
DF7052
DF7052.The geoid height was determined by GEOID03.
DF7052
DF7052;                North         East     Units Scale Factor Converg.
DF7052;SPC FL E     -  201,313.299   122,381.251   MT  1.00001554   -0 20 31.7
DF7052;SPC FL E     -  660,475.38    401,512.49    sFT  1.00001554   -0 20 31.7
DF7052
DF7052!           -  Elev Factor  x  Scale Factor =   Combined Factor
DF7052!SPC FL E     -  1.00000274  x   1.00001554  =   1.00001828
DF7052
DF7052                    SUPERSEDED SURVEY CONTROL
DF7052
DF7052.No superseded survey control is available for this station.
DF7052
DF7052_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RMJ2240892377(NAD 83)
DF7052_MARKER: STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA
DF7052
DF7052                    STATION DESCRIPTION
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DF7052
DF7052'DESCRIBED BY NATIONAL GEODETIC SURVEY 2003
DF7052'STATION IS A GPS CORS. LATEST INFORMATION INCLUDING POSITIONS AND
DF7052'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
DF7052'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
DF7052'   FTP CORS.NGS.NOAA.GOV: CORS/COORD AND CORS/STATION_LOG
DF7052'   HTTP://WWW.NGS.NOAA.GOV UNDER PRODUCTS AND SERVICES.

```
DF7988 ***********************************************************************
DF7988  CORS        -  This is a GPS Continuously Operating Reference Station.
DF7988  DESIGNATION -  RICHMOND CORS ARP
DF7988  CORS_ID     -  RMND
DF7988  PID         -  DF7988
DF7988  STATE/COUNTY-  FL/MIAMI-DADE
DF7988  USGS QUAD   -  GOULDS (1994)
DF7988
DF7988                    *CURRENT SURVEY CONTROL
DF7988 _____________________________________________________________________
DF7988* NAD 83(CORS)-  25 36 49.58921(N)    080 23 02.14117(W)     ADJUSTED
DF7988* NAVD 88     -
DF7988 _____________________________________________________________________
DF7988  EPOCH DATE  -        2002.00
DF7988  X           -     961,335.300 (meters)                 COMP
DF7988  Y           -  -5,674,075.696 (meters)                 COMP
DF7988  Z           -   2,740,535.349 (meters)                 COMP
DF7988  ELLIP HEIGHT-         -14.088 (meters)          (09/??/03) ADJUSTED
DF7988  GEOID HEIGHT-         -25.05  (meters)                 GEOID03
DF7988  HORZ ORDER  -  SPECIAL (CORS)
DF7988  ELLP ORDER  -  SPECIAL (CORS)
DF7988
DF7988.ITRF positions are available for this station.
DF7988.The coordinates were established by GPS observations
DF7988.and adjusted by the National Geodetic Survey in September 2003.
DF7988.The coordinates are valid at the epoch date displayed above.
DF7988.The epoch date for horizontal control is a decimal equivalence
DF7988.of Year/Month/Day.
DF7988
DF7988
DF7988.The PID for the CORS L1 Phase Center is DF7989.
DF7988
DF7988.The XYZ, and position/ellipsoidal ht. are equivalent.
DF7988
DF7988.The ellipsoidal height was determined by GPS observations
DF7988.and is referenced to NAD 83.
DF7988
DF7988.The geoid height was determined by GEOID03.
DF7988
DF7988;                 North         East      Units Scale Factor Converg.
DF7988;SPC FL E     -   141,973.202   261,877.112   MT  0.99998844   +0 15 58.8
DF7988;SPC FL E     -   465,790.41    859,175.16    sFT  0.99998844   +0 15 58.8
DF7988
DF7988!           -  Elev Factor  x  Scale Factor =   Combined Factor
DF7988!SPC FL E     -   1.00000221  x   0.99998844  =   0.99999065
DF7988
DF7988                    SUPERSEDED SURVEY CONTROL
DF7988
DF7988.No superseded survey control is available for this station.
DF7988
DF7988_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RNJ6185633057(NAD 83)
DF7988_MARKER: STATION IS THE ANTENNA REFERENCE POINT OF THE GPS ANTENNA
DF7988
DF7988                    STATION DESCRIPTION
DF7988
DF7988'DESCRIBED BY NATIONAL GEODETIC SURVEY 2003
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DF7988'STATION IS A GPS CORS. LATEST INFORMATION INCLUDING POSITIONS AND
DF7988'VELOCITIES ARE AVAILABLE IN THE COORDINATE AND LOG FILES ACCESSIBLE
DF7988'BY ANONYMOUS FTP OR THE WORLDWIDE WEB.
DF7988'   FTP CORS.NGS.NOAA.GOV: CORS/COORD AND CORS/STATION_LOG
DF7988'   HTTP://WWW.NGS.NOAA.GOV UNDER PRODUCTS AND SERVICES.

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AC0633 ***********************************************************************
AC0633  TIDAL BM    -  This is a Tidal Bench Mark.
AC0633  DESIGNATION -  872 4948 TIDAL 5
AC0633  PID         -  AC0633
AC0633  STATE/COUNTY-  FL/COLLIER
AC0633  USGS QUAD   -  EVERGLADES CITY (1974)
AC0633
AC0633                    *CURRENT SURVEY CONTROL
AC0633  ______________________________________________________________________
AC0633* NAD 83(2007)-  25 51 26.92450(N)    081 23 18.40005(W)     ADJUSTED
AC0633* NAVD 88     -        1.055  (meters)       3.46   (feet)  ADJUSTED
AC0633  ______________________________________________________________________
AC0633  EPOCH DATE  -       2002.00
AC0633  X           -     859,957.578 (meters)                  COMP
AC0633  Y           -  -5,678,458.485 (meters)                  COMP
AC0633  Z           -   2,764,852.062 (meters)                  COMP
AC0633  LAPLACE CORR-          -2.31  (seconds)                 DEFLEC99
AC0633  ELLIP HEIGHT-         -22.516 (meters)          (02/10/07) ADJUSTED
AC0633  GEOID HEIGHT-         -23.57  (meters)                  GEOID03
AC0633  DYNAMIC HT  -          1.053 (meters)       3.45  (feet)  COMP
AC0633
AC0633  ------- Accuracy Estimates (at 95% Confidence Level in cm) --------
AC0633  Type    PID    Designation                    North   East  Ellip
AC0633  ----------------------------------------------------------------------
AC0633  NETWORK AC0633 872 4948 TIDAL 5                1.51   1.23   2.25
AC0633  ----------------------------------------------------------------------
AC0633  MODELED GRAV-     979,020.4   (mgal)                    NAVD 88
AC0633
AC0633  VERT ORDER  -  FIRST     CLASS II
AC0633
AC0633.The horizontal coordinates were established by GPS observations
AC0633.and adjusted by the National Geodetic Survey in February 2007.
AC0633
AC0633.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
AC0633.See National Readjustment for more information.
AC0633.The horizontal coordinates are valid at the epoch date displayed above.
AC0633.The epoch date for horizontal control is a decimal equivalence
AC0633.of Year/Month/Day.
AC0633
AC0633.The orthometric height was determined by differential leveling
AC0633.and adjusted in February 2002.
AC0633.WARNING-Repeat measurements at this control monument indicate possible
AC0633.vertical movement.
AC0633
AC0633.This Tidal Bench Mark is designated as VM 9714
AC0633.by the Center for Operational Oceanographic Products and Services.
AC0633
AC0633.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AC0633
AC0633.The Laplace correction was computed from DEFLEC99 derived deflections.
AC0633
AC0633.The ellipsoidal height was determined by GPS observations
AC0633.and is referenced to NAD 83.
AC0633
AC0633.The geoid height was determined by GEOID03.
AC0633
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AC0633.The dynamic height is computed by dividing the NAVD 88
AC0633.geopotential number by the normal gravity value computed on the
AC0633.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AC0633.degrees latitude (g = 980.6199 gals.).
AC0633
AC0633.The modeled gravity was interpolated from observed gravity values.
AC0633
AC0633;   North   East   Units Scale Factor Converg.
AC0633;SPC FL E   -   168,883.881   161,065.126   MT 0.99995989   -0 10 09.9
AC0633;SPC FL E   -   554,079.87   528,427.83   sFT 0.99995989   -0 10 09.9
AC0633;UTM 17   - 2,859,958.240   461,078.411   MT 0.99961870   -0 10 09.9
AC0633
AC0633!   - Elev Factor x Scale Factor =   Combined Factor
AC0633!SPC FL E   -   1.00000354 x   0.99995989 =   0.99996343
AC0633!UTM 17   -   1.00000354 x   0.99961870 =   0.99962224
AC0633
AC0633|--|
AC0633| PID   Reference Object   Distance   Geod. Az |
AC0633| dddmmss.s |
AC0633| AC0634 872 4948 TIDAL E H 7   46.684 METERS 19929 |
AC0633|--|
AC0633
AC0633   SUPERSEDED SURVEY CONTROL
AC0633
AC0633 NAD 83(1999)- 25 51 26.92457(N)   081 23 18.40020(W) AD(   ) 1
AC0633 ELLIP H (12/12/02) -22.496 (m)   GP(   ) 4 1
AC0633 NAVD 88 (09/04/92)   1.061 (m)   3.48   (f) UNKNOWN   1 2
AC0633 NAVD 88 (06/15/91)   1.068 (m)   3.50   (f) UNKNOWN   1 2
AC0633 NGVD 29 (09/01/92)   1.479 (m)   4.85   (f) ADJUSTED   1 2
AC0633
AC0633.Superseded values are not recommended for survey control.
AC0633.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AC0633.See file dsdata.txt to determine how the superseded data were derived.
AC0633
AC0633_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RMJ6107859958(NAD 83)
AC0633_MARKER: DJ = TIDAL STATION DISK
AC0633_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AC0633_SP_SET: CONCRETE POST
AC0633_STAMPING: 5 1929
AC0633_MARK LOGO: CGS
AC0633_PROJECTION: PROJECTING 15 CENTIMETERS
AC0633_MAGNETIC: N = NO MAGNETIC MATERIAL
AC0633_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AC0633+STABILITY: SURFACE MOTION
AC0633_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AC0633+SATELLITE: SATELLITE OBSERVATIONS - May 02, 2005
AC0633
AC0633 HISTORY   - Date   Condition   Report By
AC0633 HISTORY   - 1929   MONUMENTED   CGS
AC0633 HISTORY   - 1965   GOOD   NGS
AC0633 HISTORY   - 1978   GOOD   FLDNR
AC0633 HISTORY   - 1979   GOOD   FLDNR
AC0633 HISTORY   - 1984   GOOD   FLDNR
AC0633 HISTORY   - 1990   GOOD   USPSQD
AC0633 HISTORY   - 19920226 GOOD   NGS
AC0633 HISTORY   - 20010625 GOOD   FOST

AC0633 HISTORY - 20020307 GOOD MAPTEC
AC0633 HISTORY - 20050502 GOOD USPSQD
AC0633
AC0633 STATION DESCRIPTION
AC0633
AC0633'DESCRIBED BY NATIONAL GEODETIC SURVEY 1965
AC0633'AT EVERGLADES.
AC0633'AT EVERGLADES, ABOUT 0.25 MILE WEST ALONG BROADWAY FROM THE CITY
AC0633'HALL, NEAR THE WEST EXTENSION OF BROADWAY AND NEAR THE NORTH
AC0633'EXTENSION OF RIVERSIDE DRIVE, IN THE GRASSY MEDIAN THAT
AC0633'SEPARATES BROADWAY, 32 FEET SOUTH OF THE CENTER LINE OF THE
AC0633'WESTBOUND LANE OF BROADWAY, 25 FEET EAST OF THE CENTER LINE OF
AC0633'RIVERSIDE DRIVE, 41 FEET EAST OF AND ACROSS RIVERSIDE DRIVE FROM
AC0633'THE EAST BANK OF BARRON RIVER, 153 FEET NORTHEAST OF AND ACROSS
AC0633'RIVESIDE DRIVE FROM BENCH MARK E H 7 (USE) DESCRIBED, ABOUT 1/2
AC0633'FOOT ABOVE THE LEVEL OF BROADWAY, AND SET IN TOP OF A CONCRETE
AC0633'POST PROJECTING 6 INCHES.
AC0633
AC0633 STATION RECOVERY (1978)
AC0633
AC0633'RECOVERY NOTE BY FL DEPT OF NAT RES 1978
AC0633'RECOVERED IN GOOD CONDITION.
AC0633
AC0633 STATION RECOVERY (1979)
AC0633
AC0633'RECOVERY NOTE BY FL DEPT OF NAT RES 1979
AC0633'RECOVERED IN GOOD CONDITION.
AC0633
AC0633 STATION RECOVERY (1984)
AC0633
AC0633'RECOVERY NOTE BY FL DEPT OF NAT RES 1984
AC0633'RECOVERED IN GOOD CONDITION.
AC0633
AC0633 STATION RECOVERY (1990)
AC0633
AC0633'RECOVERY NOTE BY US POWER SQUADRON 1990 (HEA)
AC0633'RECOVERED IN GOOD CONDITION.
AC0633
AC0633 STATION RECOVERY (1992)
AC0633
AC0633'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1992
AC0633'IN EVERGLADES CITY, AT THE INTERSECTION OF BROADWAY BOULEVARD AND
AC0633'RIVERSIDE DRIVE, 10.0 M (32.8 FT) SOUTH OF THE CENTER OF THE
AC0633'WESTBOUND LANES OF THE BOULEVARD, 9.8 M (32.2 FT) EAST OF THE CENTER
AC0633'OF RIVERSIDE DRIVE, 1.8 M (5.9 FT) SOUTHEAST OF A LAMP POST, 0.3 M
AC0633'(1.0 FT) ABOVE THE LEVEL OF THE BOULEVARD, AND THE MONUMENT PROJECTS
AC0633'O.2 M ABOVE THE GROUND SURFACE.
AC0633
AC0633 STATION RECOVERY (2001)
AC0633
AC0633'RECOVERY NOTE BY CHARLEY FOSTER AND ASSOCIATES 2001 (JB)
AC0633'THE MONUMENT WAS RECOVERED AS DESCRIBED.
AC0633'
AC0633
AC0633 STATION RECOVERY (2002)
AC0633

AC0633'RECOVERY NOTE BY MAPTECH INCORPORATED 2002 (CDP)
AC0633'RECOVERED AS DESCRIBED
AC0633'
AC0633
AC0633 STATION RECOVERY (2005)
AC0633
AC0633'RECOVERY NOTE BY US POWER SQUADRON 2005 (CAC)
AC0633'RECOVERED IN GOOD CONDITION.

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AC4657 ***************************************************************************
AC4657  DESIGNATION -  FLGPS GEB AZ MK
AC4657  PID        -  AC4657
AC4657  STATE/COUNTY-  FL/COLLIER
AC4657  USGS QUAD   -  GATOR HOOK SWAMP (1973)
AC4657
AC4657                    *CURRENT SURVEY CONTROL
AC4657 ______________________________________________________________________
AC4657* NAD 83(2007)-  25 52 29.65921(N)    081 12 48.95553(W)     ADJUSTED
AC4657* NAVD 88     -        1.069  (meters)       3.51   (feet)  ADJUSTED
AC4657 ______________________________________________________________________
AC4657  EPOCH DATE  -        2002.00
AC4657  X           -     877,153.401 (meters)                  COMP
AC4657  Y           -  -5,674,975.002 (meters)                  COMP
AC4657  Z           -   2,766,589.035 (meters)                  COMP
AC4657  LAPLACE CORR-          -1.87  (seconds)                 DEFLEC99
AC4657  ELLIP HEIGHT-         -22.965 (meters)          (02/10/07) ADJUSTED
AC4657  GEOID HEIGHT-         -24.02  (meters)                  GEOID03
AC4657  DYNAMIC HT  -          1.068 (meters)       3.50  (feet)  COMP
AC4657
AC4657  ------- Accuracy Estimates (at 95% Confidence Level in cm) --------
AC4657  Type    PID    Designation                    North   East  Ellip
AC4657  ----------------------------------------------------------------------
AC4657  NETWORK AC4657 FLGPS GEB AZ MK                 0.74   0.86   1.92
AC4657  ----------------------------------------------------------------------
AC4657  MODELED GRAV-     979,010.7   (mgal)                NAVD 88
AC4657
AC4657  VERT ORDER  -  FIRST     CLASS II
AC4657
AC4657.The horizontal coordinates were established by GPS observations
AC4657.and adjusted by the National Geodetic Survey in February 2007.
AC4657
AC4657.The datum tag of NAD 83(2007) is equivalent to NAD 83(NSRS2007).
AC4657.See National Readjustment for more information.
AC4657.The horizontal coordinates are valid at the epoch date displayed above.
AC4657.The epoch date for horizontal control is a decimal equivalence
AC4657.of Year/Month/Day.
AC4657
AC4657.The orthometric height was determined by differential leveling
AC4657.and adjusted in September 1992.
AC4657.WARNING-GPS observations at this control monument resulted in a GPS
AC4657.derived orthometric height which differed from the leveled height by
AC4657.more than one decimeter (0.1 meter).
AC4657
AC4657.The X, Y, and Z were computed from the position and the ellipsoidal ht.
AC4657
AC4657.The Laplace correction was computed from DEFLEC99 derived deflections.
AC4657
AC4657.The ellipsoidal height was determined by GPS observations
AC4657.and is referenced to NAD 83.
AC4657
AC4657.The geoid height was determined by GEOID03.
AC4657
AC4657.The dynamic height is computed by dividing the NAVD 88
AC4657.geopotential number by the normal gravity value computed on the
AC4657.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
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AC4657.degrees latitude (g = 980.6199 gals.).
AC4657
AC4657.The modeled gravity was interpolated from observed gravity values.
AC4657
AC4657; North East Units Scale Factor Converg.
AC4657;SPC FL E - 170,774.209 178,593.611 MT 0.99994683 -0 05 35.6
AC4657;SPC FL E - 560,281.72 585,935.87 sFT 0.99994683 -0 05 35.6
AC4657;UTM 17 - 2,861,847.923 478,600.914 MT 0.99960565 -0 05 35.6
AC4657
AC4657! - Elev Factor x Scale Factor = Combined Factor
AC4657!SPC FL E - 1.00000361 x 0.99994683 = 0.99995044
AC4657!UTM 17 - 1.00000361 x 0.99960565 = 0.99960926
AC4657
AC4657: Primary Azimuth Mark Grid Az
AC4657:SPC FL E - FLGPS GEB 276 58 21.4
AC4657:UTM 17 - FLGPS GEB 276 58 21.4
AC4657
AC4657|--|
AC4657| PID Reference Object Distance Geod. Az |
AC4657| dddmmss.s |
AC4657| AC4646 FLGPS GEB APPROX. 0.8 KM 2765245.8 |
AC4657|--|
AC4657
AC4657 SUPERSEDED SURVEY CONTROL
AC4657
AC4657 NAD 83(1999)- 25 52 29.65906(N) 081 12 48.95698(W) AD( ) 1
AC4657 ELLIP H (12/13/01) -22.952 (m) GP( ) 5 1
AC4657 NAD 83(1990)- 25 52 29.65477(N) 081 12 48.95240(W) AD( ) 1
AC4657 NAVD 88 (12/12/02) 1.07 (m) 3.5 (f) LEVELING 3
AC4657 NGVD 29 (09/01/92) 1.498 (m) 4.91 (f) ADJUSTED 1 2
AC4657
AC4657.Superseded values are not recommended for survey control.
AC4657.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AC4657.See file dsdata.txt to determine how the superseded data were derived.
AC4657
AC4657_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RMJ7860161848(NAD 83)
AC4657_MARKER: F = FLANGE-ENCASED ROD
AC4657_SETTING: 59 = STAINLESS STEEL ROD IN SLEEVE (10 FT.+)
AC4657_SP_SET: STAINLESS STEEL ROD IN SLEEVE
AC4657_STAMPING: FLGPS GEB AZ MK 1989
AC4657_MARK LOGO: NGS
AC4657_PROJECTION: PROJECTING 10 CENTIMETERS
AC4657_MAGNETIC: N = NO MAGNETIC MATERIAL
AC4657_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL
AC4657_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AC4657+SATELLITE: SATELLITE OBSERVATIONS - 2002
AC4657_ROD/PIPE-DEPTH: 6.90 meters
AC4657_SLEEVE-DEPTH : 0.91 meters
AC4657
AC4657 HISTORY - Date Condition Report By
AC4657 HISTORY - 1989 MONUMENTED NGS
AC4657 HISTORY - 19920316 GOOD NGS
AC4657 HISTORY - 19991231 GOOD USPSQD
AC4657 HISTORY - 20010908 GOOD LDBLS
AC4657 HISTORY - 2002 GOOD MAPTEC
AC4657

AC4657 STATION DESCRIPTION
AC4657
AC4657'DESCRIBED BY NATIONAL GEODETIC SURVEY 1989
AC4657'THE STATION IS LOCATED ABOUT 11.26 KM (7.00 MI) WEST OF MONROE
AC4657'STATION, 10.46 KM (6.50 MI) EAST OF OCHOPEE, IN SECTION 10, T 53 S, R
AC4657'31 E. OWNERSHIP--HIGHWAY RIGHT-OF-WAY.
AC4657'TO REACH THE STATION FROM THE INTERSECTION OF STATE ROAD 839 AND U.S.
AC4657'HIGHWAY 41 (TAMIAMI TRAIL) IN OCHAPEE, GO EAST FOR 3.62 KM (2.25 MI)
AC4657'ON HIGHWAY 41 TO A BRIDGE OVER A CANAL. CONTINUE AHEAD AND GO EAST
AC4657'FOR 1.45 KM (0.90 MI) ON HIGHWAY 41 TO THE STATION ON RIGHT.
AC4657'THE STATION IS RECESSED 10 CM BELOW GROUND. LOCATED 31.46 M
AC4657'(103.2 FT) SOUTH FROM THE APPROXIMATE CENTER OF HIGHWAY 41, 21.64 M
AC4657'(71.0 FT) SOUTH FROM AT+T FIBER OPTIC CABLE WITNESS POST NUMBER 910,
AC4657'8.69 M (28.5 FT) EAST-NORTHEAST FROM A LONE CABBAGE PALM AND 0.91 M
AC4657'(3.0 FT) NORTH FROM A CARSONITE WITNESS POST. NOTE--ACCESS TO DATUM
AC4657'POINT IS HAD THROUGH A 5-INCH LOGO CAP.
AC4657'DESCRIBED BY R.L. MALLOY.
AC4657
AC4657 STATION RECOVERY (1992)
AC4657
AC4657'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1992
AC4657'66.5 KM (41.30 MI) EASTERLY ALONG U.S. HIGHWAY 41 FROM THE JUNCTION
AC4657'OF STATE HIGHWAY 84 IN NAPLES, 160.0 M (524.9 FT) EAST OF BENCH MARK
AC4657'W 248, 31.4 M (103.0 FT) SOUTH OF THE CENTERLINE OF THE HIGHWAY, 21.4
AC4657'M (70.2 FT) SOUTH OF UNDERGROUND CABLE WARNING SIGN NUMBER 910, AND
AC4657'0.9 M (3.0 FT) NORTH OF A WITNESS POST. NOTE--ACCESS TO THE DATUM
AC4657'POINT IS THROUGH A 5-INCH LOGO CAP.
AC4657
AC4657 STATION RECOVERY (1999)
AC4657
AC4657'RECOVERY NOTE BY US POWER SQUADRON 1999
AC4657'RECOVERED IN GOOD CONDITION.
AC4657
AC4657 STATION RECOVERY (2001)
AC4657
AC4657'RECOVERY NOTE BY LD BRADLEY LAND SURVEYORS 2001 (JCH)
AC4657'THE MARK IS ABOUT 66.1 KM (41.13 MI) SOUTHEAST OF NAPLES, ABOUT (59.31
AC4657'MILES)
AC4657'NORTHWEST OF WEST MIAMI, AND ABOUT 11.5 KM (7.12 MI) NORTHWEST OF
AC4657'MONROE
AC4657'STATION, IN SECTION 10, TOWNSHIP 53 SOUTH, RANGE 31 EAST, COLLIER
AC4657'COUNTY,
AC4657'FLORIDA. OWNERSHIP - FLORIDA DEPARTMENT OF TRANSPORTATION.
AC4657'
AC4657'TO REACH THE MARK FROM THE INTERSECTION OF U.S. HIGHWAY 41 (TAMIAMI
AC4657'TRAIL) AND
AC4657'STATE ROAD 29 IN CARNESTOWN, GO SOUTHEAST ON U.S. HIGHWAY 41 6.9 KM
AC4657'(4.3 MI) TO
AC4657'THE POST OFFICE IN OCHOPEE, CONTINUE SOUTHEAST ON U.S. HIGHWAY 41 9.0
AC4657'KM (5.59
AC4657'MI) TO THE MARK ON THE RIGHT.
AC4657'
AC4657'THE MARK IS 31.49 M (103.3 FT) SOUTHWEST OF THE CENTERLINE OF U.S.
AC4657'HIGHWAY 41,
AC4657'21.52 M (70.6 FT) SOUTHWEST OF ATT CABLE ROUTE MARKER 910, AND 0.30 M
AC4657'(1.0 FT)

AC4657'NORTHEAST OF A CARSONITE WITNESS POST. THE DATUM POINT IS SET 10 CM
AC4657'(0.34 FT)
AC4657'ABOVE THE LEVEL OF THE GROUND AND ABOUT 0.55 M (1.8 FT) BELOW THE
AC4657'LEVEL OF THE
AC4657'HIGHWAY, BEING THE TOP OF A STAINLESS STEEL ROD ENCASED IN A 5-INCH
AC4657'PVC PIPE
AC4657'WITH AN ACCESS COVER.
AC4657'
AC4657'NOTE - A MAGNET WAS PLACED INSIDE THE SLEEVE, BELOW THE ACCESS COVER.
AC4657'
AC4657
AC4657 STATION RECOVERY (2002)
AC4657
AC4657'RECOVERY NOTE BY MAPTECH INCORPORATED 2002 (CDP)
AC4657'THE MARK IS ABOUT 66.1 KM (41.13 MI) SOUTHEAST OF NAPLES, ABOUT (59.31
AC4657'MILES)
AC4657'NORTHWEST OF WEST MIAMI, AND ABOUT 11.5 KM (7.12 MI) NORTHWEST OF
AC4657'MONROE
AC4657'STATION, IN SECTION 10, TOWNSHIP 53 SOUTH, RANGE 31 EAST, COLLIER
AC4657'COUNTY,
AC4657'FLORIDA. OWNERSHIP - FLORIDA DEPARTMENT OF TRANSPORTATION.
AC4657'
AC4657'TO REACH THE MARK FROM THE INTERSECTION OF U.S. HIGHWAY 41 (TAMIAMI
AC4657'TRAIL) AND
AC4657'STATE ROAD 29 IN CARNESTOWN, GO SOUTHEAST ON U.S. HIGHWAY 41 6.9 KM
AC4657'(4.3 MI) TO
AC4657'THE POST OFFICE IN OCHOPEE, CONTINUE SOUTHEAST ON U.S. HIGHWAY 41 9.0
AC4657'KM (5.59
AC4657'MI) TO THE MARK ON THE RIGHT.
AC4657'
AC4657'THE MARK IS 31.49 M (103.3 FT) SOUTHWEST OF THE CENTERLINE OF U.S.
AC4657'HIGHWAY 41,
AC4657'21.52 M (70.6 FT) SOUTHWEST OF ATT CABLE ROUTE MARKER 910, AND 0.30 M
AC4657'(1.0 FT)
AC4657'NORTHEAST OF A CARSONITE WITNESS POST. THE DATUM POINT IS SET 10 CM
AC4657'(0.34 FT)
AC4657'ABOVE THE LEVEL OF THE GROUND AND ABOUT 0.55 M (1.8 FT) BELOW THE
AC4657'LEVEL OF THE
AC4657'HIGHWAY, BEING THE TOP OF A STAINLESS STEEL ROD ENCASED IN A 5-INCH
AC4657'PVC PIPE
AC4657'WITH AN ACCESS COVER.
AC4657'
AC4657'NOTE - A MAGNET WAS PLACED INSIDE THE SLEEVE, BELOW THE ACCESS COVER.
AC4657'
AC4657'STATION RECOVERY (2002)
AC4657'RECOVERY NOTE BY MAPTECH, INCORPORATED (CP)
AC4657'RECOVERED AS DESCRIBED.
AC4657'
AC4657'

SURVEY INFORMATION

A. Field Personnel

The following field personnel worked on this GPS network, and related survey collection:

Field Supervisor: J. Purpera
Party Chief: M. Havard
Instrument Man: V. McNeal
Instrument Man: C. LaPrarie

The point of contact for survey related questions is:

Josh Hardy
Operations Supervisor
(985) 661-3001

B. GPS Logsheets

GPS CONTROL SURVEY
FIELD DATA SHEET

PAGE: 1

3001 the geospatial company®
501 Robert Blvd 2nd Floor
Slidell, LA 70458
985-661-3001 Office 985-649-5082 Fax

JOB REFERENCE	POINT ID:	1B
FLIDAR-TO10	Proj. No.:	07190.01.001.555

STATE	FLORIDA	COUNTY	COLLIER	Country	USA	Quad	

OPERATOR	PURPERA

RECEIVER MODEL	TRIMBLE 4000 SE
RECEIVER S/N	4305

APPROXIMATE POSITION (C/A/CODE)			
LATITUDE	25 48 52.99N		HGT. MTS
LONGITUDE	81 21 37.50W		

SESSION	DATE:	12/04/07	START TIME	18:38	Record Interval	X	U.T.C.
001B-338-1	DAY OF YEAR	338	END TIME	19:52	15 SEC.		LOCAL

ANTENNA HEIGHT (SLANT)				
MTRS/FT				
	MEASURED		FIXED HGT.	

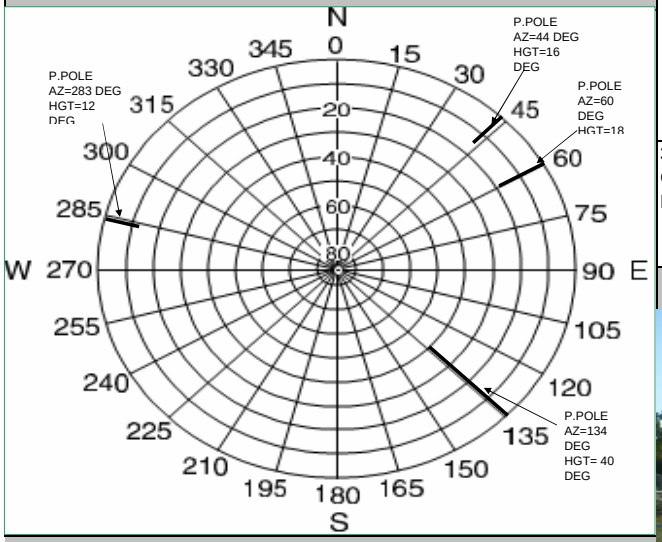
ANTENNA INFO			
RADIUS (M)			0.000
S/N NUMBER	10019		0.000
ANTENNA TYPE	COMPAC L1/L2 WITH GROUND PLANE		

ANTENNA HEIGHT (VERTICAL)				
MTRS/FT	2.000M (UNCORRECTED)			
	MEASURED	X	FIXED HGT	

TOP OF MONUMENT IS:	X	FLUSH
METERS/FEET		ABOVE GROUND
METERS/FEET		BELOW GROUND

	AERIAL TARGET		PHOTO I.D.
	PUB. BENCH MARK		NEW CONTROL
	PUB. CONTROL	X	BASE STATION

OBSTRUCTION DIAGRAM



3001 Description:1B IS A SPIKE NAIL SET FLUSH WITH THE GROUND 15' SOUTH OF THE C/L OF DENERE LANE, 13' NORTH OF A CORNER FENCE POST AND 35' NW OF A ROUND UNDERGROUND CABLE WARNING BOX.

SKETCH

Photo

GPS CONTROL SURVEY
FIELD DATA SHEET

PAGE:
1

501 Robert Blvd 2nd Floor
Slidell, LA 70458
985-661-3001 Office 985-649-5082 Fax

JOB REFERENCE	POINT ID:	1B
FLIDAR-TO10	Proj. No.:	07190.01.001.555

STATE	FLORIDA	COUNTY	COLLIER	Country	USA	Quad	

OPERATOR	PURPERA

RECEIVER MODEL	TRIMBLE 4000 SE
RECEIVER S/N	4302

APPROXIMATE POSITION (C/A/CODE)			
LATITUDE	25 48 52.99N		HGT. MTS
LONGITUDE	81 21 37.50W		

SESSION	DATE:	12/05/07	START TIME	13:07	Record Interval	X	U.T.C.
001B-339-1	DAY OF YEAR	339	END TIME	14:41	15 SEC.		LOCAL

ANTENNA HEIGHT (SLANT)				
MTRS/FT				
	MEASURED			FIXED HGT.

ANTENNA INFO			
RADIUS (M)			0.000
S/N NUMBER	24415		0.000
ANTENNA TYPE	COMPAC L1/L2 WITH GROUND PLANE		

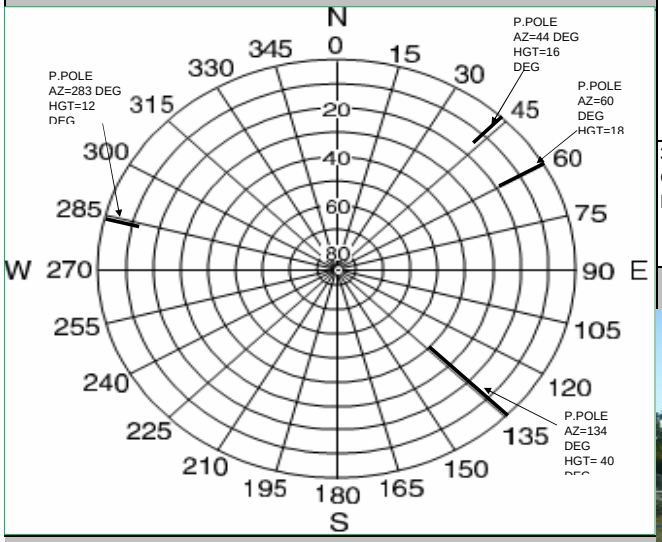
ANTENNA HEIGHT (VERTICAL)				
MTRS/FT	2.000M (UNCORRECTED)			
	MEASURED	X		FIXED HGT

TOP OF MONUMENT IS:	X	FLUSH
METERS/FEET		ABOVE GROUND
METERS/FEET		BELOW GROUND

	AERIAL TARGET		PHOTO I.D.
	PUB. BENCH MARK		NEW CONTROL
	PUB. CONTROL	X	BASE STATION

3001 Description:1B IS A SPIKE NAIL SET FLUSH WITH THE GROUND 15' SOUTH OF THE C/L OF DENERE LANE, 13' NORTH OF A CORNER FENCE POST AND 35' NW OF A ROUND UNDERGROUND CABLE WARNING BOX.

OBSTRUCTION DIAGRAM



Photo

SKETCH

GPS CONTROL SURVEY
FIELD DATA SHEET

PAGE:
1

501 Robert Blvd 2nd Floor
Slidell, LA 70458
985-661-3001 Office 985-649-5082 Fax

JOB REFERENCE	POINT ID:	1B
FLIDAR-TO10	Proj. No.:	07190.01.001.555

STATE	FLORIDA	COUNTY	COLLIER	Country	USA	Quad	

OPERATOR	PURPERA

RECEIVER MODEL	TRIMBLE 4000 SE
RECEIVER S/N	4302

APPROXIMATE POSITION (C/A/CODE)			
LATITUDE	25 48 52.99N		HGT. MTS
LONGITUDE	81 21 37.50W		

SESSION	DATE:	12/05/07	START TIME	14:46	Record Interval	X	U.T.C.
001B-339-2	DAY OF YEAR	339	END TIME	16:19	15 SEC.		LOCAL

ANTENNA HEIGHT (SLANT)				
MTRS/FT				
	MEASURED		FIXED HGT.	

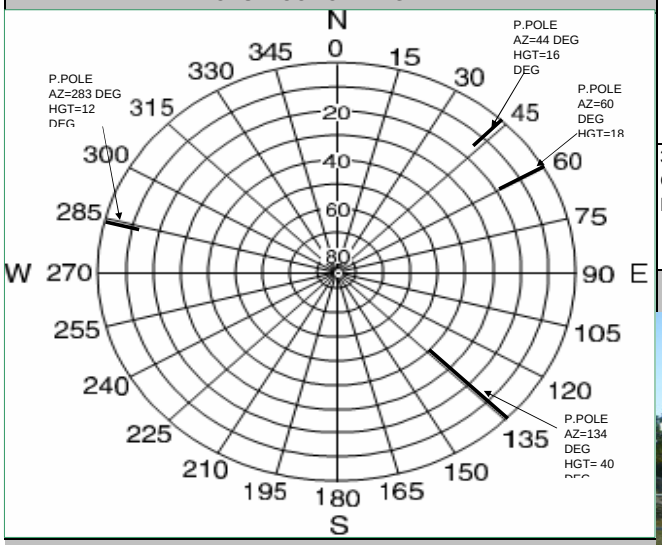
ANTENNA INFO			
RADIUS (M)			0.000
S/N NUMBER	24415		0.000
ANTENNA TYPE	COMPAC L1/L2 WITH GROUND PLANE		

ANTENNA HEIGHT (VERTICAL)			
MTRS/FT	2.000M (UNCORRECTED)		
	MEASURED	X	FIXED HGT

TOP OF MONUMENT IS:	X	FLUSH
METERS/FEET		ABOVE GROUND
METERS/FEET		BELOW GROUND

	AERIAL TARGET		PHOTO I.D.
	PUB. BENCH MARK		NEW CONTROL
	PUB. CONTROL	X	BASE STATION

OBSTRUCTION DIAGRAM



3001 Description:1B IS A SPIKE NAIL SET FLUSH WITH THE GROUND 15' SOUTH OF THE C/L OF DENERE LANE, 13' NORTH OF A CORNER FENCE POST AND 35' NW OF A ROUND UNDERGROUND CABLE WARNING BOX.

SKETCH

Photo

GPS CONTROL SURVEY
FIELD DATA SHEET

PAGE: 1

501 Robert Blvd 2nd Floor
Slidell, LA 70458
985-661-3001 Office 985-649-5082 Fax

JOB REFERENCE	POINT ID:	1C
FLIDAR-TO10	Proj. No.:	07190.01.001.555

STATE	FLORIDA	COUNTY	COLLIER	Country	USA	Quad	

OPERATOR	PURPERA

APPROXIMATE POSITION (C/A/CODE)			
LATITUDE	25 48 52.60N		HGT. MTS
LONGITUDE	81 21 34.10W		

RECEIVER MODEL	TRIMBLE 4000 SE
RECEIVER S/N	4302

SESSION	DATE:	12/04/07	START TIME	18:45	Record Interval	X	U.T.C.
001C-338-1	DAY OF YEAR	338	END TIME	19:16	15 SEC.		LOCAL

ANTENNA HEIGHT (SLANT)				
MTRS/FT				
	MEASURED		FIXED HGT.	

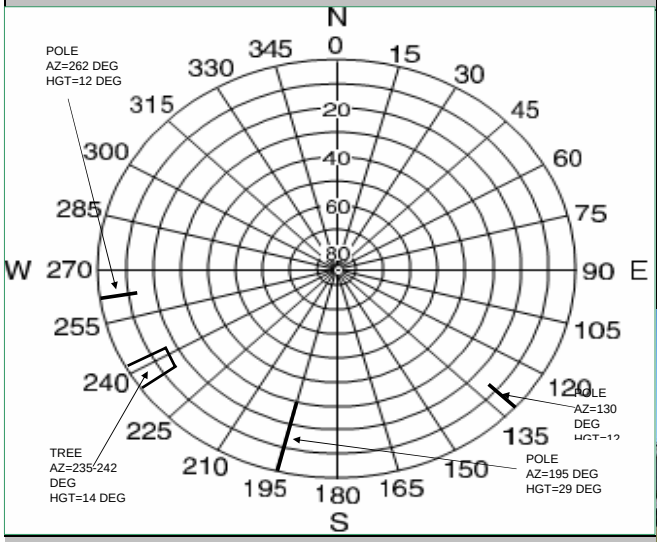
ANTENNA INFO			
RADIUS (M)			0.000
S/N NUMBER	24415		0.000
ANTENNA TYPE	COMPAC L1/L2 WITH GROUND PLANE		

ANTENNA HEIGHT (VERTICAL)				
MTRS/FT	2.000M (UNCORRECTED)			
	MEASURED	X	FIXED HGT	

TOP OF MONUMENT IS:	X	FLUSH
METERS/FEET		ABOVE GROUND
METERS/FEET		BELOW GROUND

	AERIAL TARGET		PHOTO I.D.
	PUB. BENCH MARK		NEW CONTROL
	PUB. CONTROL	X	BASE STATION

OBSTRUCTION DIAGRAM



SKETCH

3001 Description: 1C IS A SPIKE NAIL FLUSH WITH THE GROUND 37' WEST OF THE C/L OF HWY 29, 29.5' NORTH OF DEMERE LANE AND 26.5' NE OF THE C/L OF A PLASTIC JUNCTION BOX.

Photo

GPS CONTROL SURVEY
FIELD DATA SHEET

PAGE: 1

501 Robert Blvd 2nd Floor
Slidell, LA 70458
985-661-3001 Office 985-649-5082 Fax

JOB REFERENCE	POINT ID:	1C
FLIDAR-TO10	Proj. No.:	07190.01.001.555

STATE	FLORIDA	COUNTY	COLLIER	Country	USA	Quad	

OPERATOR	PURPERA

RECEIVER MODEL	TRIMBLE 4000 SE
RECEIVER S/N	4302

APPROXIMATE POSITION (C/A/CODE)			
LATITUDE	25 48 52.60N		HGT. MTS
LONGITUDE	81 21 34.10W		

SESSION	DATE:	12/04/07	START TIME	19:21	Record Interval	X	U.T.C.
001C-338-2	DAY OF YEAR	338	END TIME	19:52	15 SEC.		LOCAL

ANTENNA HEIGHT (SLANT)				
MTRS/FT				
	MEASURED		FIXED HGT.	

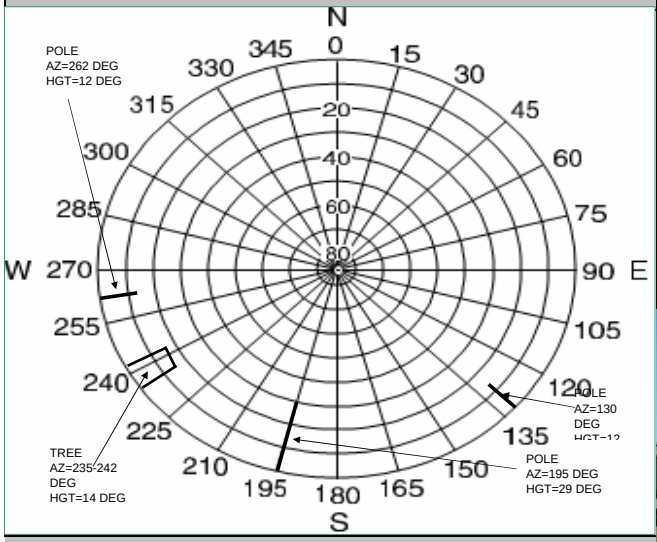
ANTENNA HEIGHT (VERTICAL)				
MTRS/FT	2.000M (UNCORRECTED)			
	MEASURED	X	FIXED HGT	

ANTENNA INFO			
RADIUS (M)			0.000
S/N NUMBER	24415		0.000
ANTENNA TYPE	COMPAC L1/L2 WITH GROUND PLANE		

TOP OF MONUMENT IS:	X	FLUSH
METERS/FEET		ABOVE GROUND
METERS/FEET		BELOW GROUND

	AERIAL TARGET		PHOTO I.D.
	PUB. BENCH MARK		NEW CONTROL
	PUB. CONTROL	X	BASE STATION

OBSTRUCTION DIAGRAM



SKETCH

3001 Description: 1C IS A SPIKE NAIL FLUSH WITH THE GROUND 37' WEST OF THE C/L OF HWY 29, 29.5' NORTH OF DEMERE LANE AND 26.5' NE OF THE C/L OF A PLASTIC JUNCTION BOX.

Photo

GPS CONTROL SURVEY
FIELD DATA SHEET

PAGE:
1

501 Robert Blvd 2nd Floor
Slidell, LA 70458
985-661-3001 Office 985-649-5082 Fax

JOB REFERENCE	POINT ID:	FLGPS GEB AZ MK
FL-LIDAR-TO10	Proj. No.:	07190.01.001.555

STATE	FLORIDA	COUNTY	COLLIER	Country	USA	Quad	GATOR HOOK SWAMP 1973

OPERATOR	PURPERA

RECEIVER MODEL	TRIMBLE 4000 SE
RECEIVER S/N	4305

APPROXIMATE POSITION (C/A/CODE)			
LATITUDE	25 52 29.65921N		HGT. MTS
LONGITUDE	081 12 48.95553W		1.069

SESSION	DATE:	12/05/07	START TIME	12:36	Record Interval	X	U.T.C.
GEBA 339 1	DAY OF YEAR	339	END TIME	17:26	15 SEC.		LOCAL

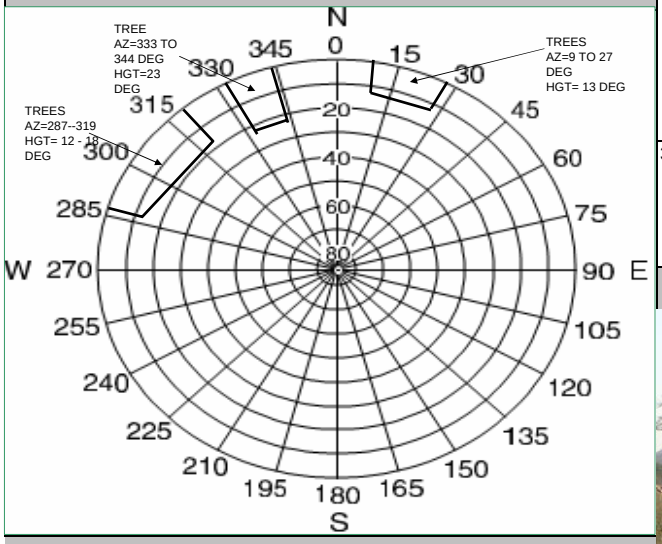
ANTENNA HEIGHT (SLANT)				
MTRS/FT				
	MEASURED		FIXED HGT.	

ANTENNA INFO			
RADIUS (M)			0.000
S/N NUMBER	10019		0.000
ANTENNA TYPE	COMPAC L1/L2 WITH GROUND PLANE		

ANTENNA HEIGHT (VERTICAL)			
MTRS/FT	2.000M (UNCORRECTED)		
	MEASURED	X	FIXED HGT

TOP OF MONUMENT IS:		FLUSH
METERS/FEET		ABOVE GROUND
METERS/FEET		BELOW GROUND

OBSTRUCTION DIAGRAM



	AERIAL TARGET			PHOTO I.D.	
	PUB. BENCH MARK			NEW CONTROL	
X	PUB. CONTROL		X	BASE STATION	

3001 Description: REF NGS DATASHEET-- PID AC4657

SKETCH

Photo

GPS CONTROL SURVEY
FIELD DATA SHEET

PAGE:
1

501 Robert Blvd 2nd Floor
Slidell, LA 70458
985-661-3001 Office 985-649-5082 Fax

JOB REFERENCE	POINT ID:	PP 1
FLIDAR-TO10	Proj. No.:	07190.01.001.555

STATE	FLORIDA	COUNTY	COLLIER	Country	USA	Quad	

OPERATOR	V. MCNEAL

APPROXIMATE POSITION (C/A/CODE)			
LATITUDE	25 48 43.35N		HGT. MTS
LONGITUDE	081 21 33.21N		

RECEIVER MODEL	TRIMBLE 4700
RECEIVER S/N	9073

SESSION	DATE:	12/05/07	START TIME	13:10	Record Interval	X	U.T.C.
PP01-339-1	DAY OF YEAR	339	END TIME	14:41	15 SEC.		LOCAL

ANTENNA HEIGHT (SLANT)				
MTRS/FT				
	MEASURED		FIXED HGT.	

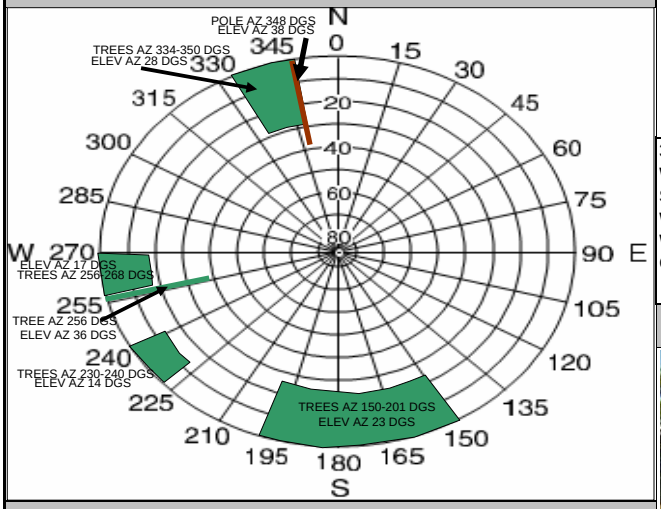
ANTENNA INFO			
RADIUS (M)			0.000
S/N NUMBER	90103		0.000
ANTENNA TYPE	TRIMBLE MICRO-CENTERED L1/L2		

ANTENNA HEIGHT (VERTICAL)				
MTRS/FT	2.000M (UNCORRECTED)			
	MEASURED	X	FIXED HGT	

TOP OF MONUMENT IS:		X	FLUSH
METERS/FEET			ABOVE GROUND
METERS/FEET			BELOW GROUND

	AERIAL TARGET	X	PHOTO I.D.
	PUB. BENCH MARK		NEW CONTROL
	PUB. CONTROL		BASE STATION

OBSTRUCTION DIAGRAM



Sketch

3001 Description: PP 1 IS A PAINTED PANEL POINT THAT IS T-SHAPED AND IS WHITE W/BLACK TRIM WHERE THE WHITE FROM W TO E IS 28FT AND THE WHITE FROM N TO S IS 16FT AND THE BLACK TRIM IS 0.5FT WIDE AND IS A PK NAIL SET FLUSH W/ASPHALT IN THE CENTER OF THE W TO E AND THE C/L OF THE N TO S OF THE WHITE PAINT. POINT IS 1.5FT N OF THE E/R OF CHOKOLOSKEE DR-- 10FT S OF THE C/L OF CHOLOSKEE DR-- 57FT C/L OF SMALLWOOD DR. PICTURE LOOKING WEST.

Photo

GPS CONTROL SURVEY
FIELD DATA SHEET

PAGE:
1

3001 the geospatial company®
501 Robert Blvd 2nd Floor
Slidell, LA 70458
985-661-3001 Office 985-649-5082 Fax

JOB REFERENCE	POINT ID:	PP 1
FLIDAR-TO10	Proj. No.:	07190.01.001.555

STATE	FLORIDA	COUNTY	COLLIER	Country	USA	Quad	

OPERATOR	V. MCNEAL

APPROXIMATE POSITION (C/A/CODE)			
LATITUDE	25 48 43.35N		HGT. MTS
LONGITUDE	081 21 33.21N		

RECEIVER MODEL	TRIMBLE 4700
RECEIVER S/N	9073

SESSION	DATE:	12/05/07	START TIME	14:46	Record Interval	X	U.T.C.
PP01-339-2	DAY OF YEAR	339	END TIME	16:17	15 SEC.		LOCAL

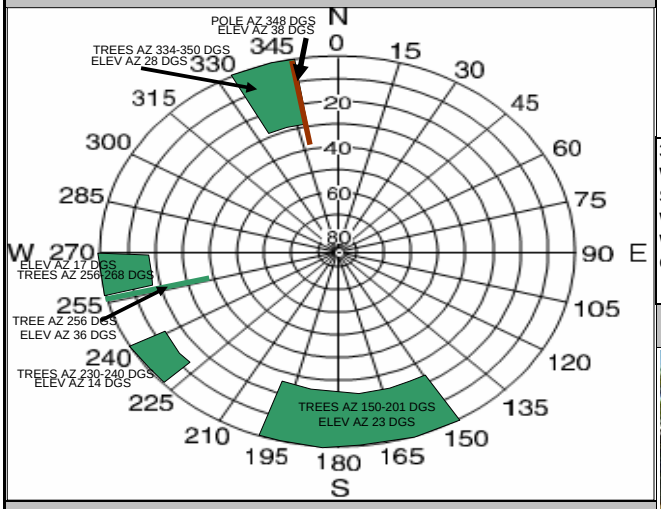
ANTENNA HEIGHT (SLANT)				
MTRS/FT				
	MEASURED		FIXED HGT.	

ANTENNA INFO			
RADIUS (M)			0.000
S/N NUMBER	90101		0.000
ANTENNA TYPE	TRIMBLE MICRO-CENTERED L1/L2		

ANTENNA HEIGHT (VERTICAL)				
MTRS/FT	2.000M (UNCORRECTED)			
	MEASURED	X	FIXED HGT	

TOP OF MONUMENT IS:		X	FLUSH
METERS/FEET			ABOVE GROUND
METERS/FEET			BELOW GROUND

OBSTRUCTION DIAGRAM



Sketch

	AERIAL TARGET	X	PHOTO I.D.
	PUB. BENCH MARK		NEW CONTROL
	PUB. CONTROL		BASE STATION

3001 Description: PP 1 IS A PAINTED PANEL POINT THAT IS T-SHAPED AND IS WHITE W/BLACK TRIM WHERE THE WHITE FROM W TO E IS 28FT AND THE WHITE FROM N TO S IS 16FT AND THE BLACK TRIM IS 0.5FT WIDE AND IS A PK NAIL SET FLUSH W/ASPHALT IN THE CENTER OF THE W TO E AND THE C/L OF THE N TO S OF THE WHITE PAINT. POINT IS 1.5FT N OF THE E/R OF CHOKOLOSKEE DR-- 10FT S OF THE C/L OF CHOLOSKEE DR-- 57FT C/L OF SMALLWOOD DR. PICTURE LOOKING WEST.

Photo

GPS CONTROL SURVEY
FIELD DATA SHEET

PAGE:
1

3001 the geospatial company®
501 Robert Blvd 2nd Floor
Slidell, LA 70458
985-661-3001 Office 985-649-5082 Fax

JOB REFERENCE	POINT ID:	872_4948 TIDAL 5-PID=AC0633
FLIDAR-TO10	Proj. No.:	07190.01.001.555

STATE	FLORIDA	COUNTY	COLLIER	Country	USA	Quad	EVERGLADES CITY (1974)

OPERATOR	V. MCNEAL

RECEIVER MODEL	TRIMBLE 4000 SSi
RECEIVER S/N	3158

APPROXIMATE POSITION (C/A/CODE)			
LATITUDE	25 51 26.92450(N)		HGT. MTS
LONGITUDE	081 23 18.40005(W)		1.055

SESSION	DATE:	12/05/07	START TIME	12:32	Record Interval	X	U.T.C.
TID5-339-1	DAY OF YEAR	339	END TIME	16:45	15 SEC.		LOCAL

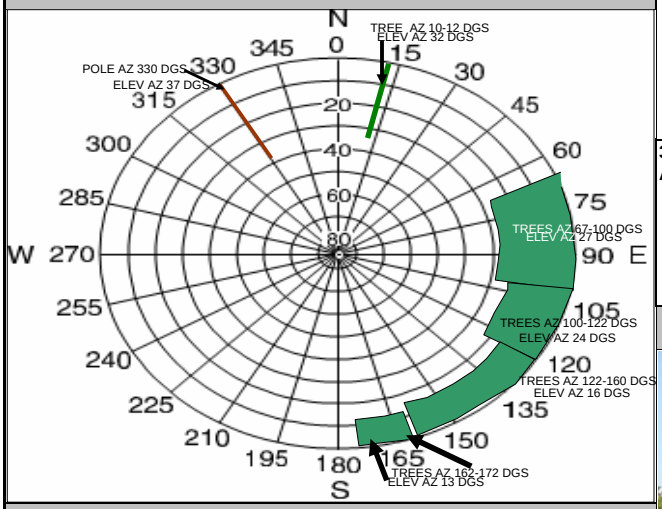
ANTENNA HEIGHT (SLANT)				
MTRS/FT				
	MEASURED		FIXED HGT.	

ANTENNA HEIGHT (VERTICAL)				
MTRS/FT	2.000M (UNCORRECTED)			
	MEASURED	X	FIXED HGT	

ANTENNA INFO			
RADIUS (M)			0.000
S/N NUMBER	10018		0.000
ANTENNA TYPE	TRIMBLE COMP L1/L2 W/GRD PLANE		

TOP OF MONUMENT IS:		FLUSH
METERS/FEET	0.4FT	ABOVE GROUND
METERS/FEET		BELOW GROUND

OBSTRUCTION DIAGRAM



Sketch

	AERIAL TARGET		PHOTO I.D.
	PUB. BENCH MARK		NEW CONTROL
X	PUB. CONTROL	X	BASE STATION

3001 Description:FOR OF 872_4948 TIDAL 5-PID=AC0633 SEE NGS DATA SHEET # AC0633. POINT IS A SURVEY DISK IN THE TOP OF CONC.

Photo

TOPO Log

Project Name: FLIDAR
Project No: 07190.01.001.555
Project Location: BLOCK 10

FILE NAME=442DAY.DC

Date	Site	Ref. Station	Ant. Hgt	Ant. Type	Start Point	End Point	Ant. Hgt	Ant. Type	Point Code
12/10/07	1-TO10	1B	2.063M	TRIMBLE COMPAC L1/L2 WITH GROUND PLANE	1C CHK		2.063M	TRIMBLE MICRO CENTERED L1/L2	SPIKE NAIL
12/10/07	1-TO10	1B	1.623M	SOKKIA SET 3B TOTAL STATION	1C CHK		2.063M	SECO FIXED HEIGHT TRIPOD WITH PRISM	SPIKE NAIL
12/10/07	1-TO10	1B	1.623M	SOKKIA SET 3B TOTAL STATION	1A1	1A20	1.86M	FIBER ROD WITH PRISM	A111
12/10/07	1-TO10	1B	1.623M	SOKKIA SET 3B TOTAL STATION	1A21	1A40	1.86M	FIBER ROD WITH PRISM	3111
12/10/07	1-TO10	1B	1.623M	SOKKIA SET 3B TOTAL STATION	1A41	1A65	1.86M	FIBER ROD WITH PRISM	C111
12/10/07	1-TO10	1B	1.623M	SOKKIA SET 3B TOTAL STATION	1A66	1A80	1.86M	FIBER ROD WITH PRISM	C111
12/10/07	1-TO10	1B	1.623M	SOKKIA SET 3B TOTAL STATION	1A81	1A83	1.86M	FIBER ROD WITH PRISM	CORNERS CONCRETE SLAB
12/10/07	1-TO10	1B	1.623M	SOKKIA SET 3B TOTAL STATION	1C CHK		1.063M	SECO FIXED HEIGHT TRIPOD WITH PRISM	SPIKE NAIL

Ground Check-Point Descriptive Codes

Surface Type		Sky Visibility		Surface Slope		Confidence	
1	Dirt	1	Open	1	Flat	1	Good
2	Sand	2	Part open	2	Slight Slope	2	Fair
3	Asphalt	3	Covered	3	Slope	3	Bad
4	Concrete						
5	Tall Grass						
6	Mowed Grass						
7	Trees and Brush						
8	Weeds and short grass						
9	Thick brush						
A	Thich cut grass						
B	Cultivated field - unplowed						
C	Limestone						
D	Trees and grass						
E	Gravel						
F	Brush and grass						