

Surveyor's Report

**Well Sites: Holeyland, Rotenberger, TCEYDC,
3ANE, & 3ANW
Well Site Surveys
Broward, Okeechobee and Palm Beach Counties,
Florida**

SFWMD Work Order Number: 2

Contractors Project No. 4600000947

Report Date: 12/11/08

Submittal: Final

Prepared for:

South Florida Water Management District



Prepared By:



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EXCEPTIONAL SOLUTIONS
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Purpose

The purpose of this project is to establish site benchmarks with North American Vertical Datum of 1988 (NAVD 1988) and National Geodetic Vertical Datum of 1929 (NGVD 1929) at six well sites. Five are located within the Holeyland and Rotenberger Wild Life Management Areas in Palm Beach County and one is located in Okeechobee County at the Eckerd Youth Center. Additional benchmarks shall also be established on the well platforms and the measured distance to water shall also be recorded. Site photographs shall also be taken with close-ups of the recorder and the inside of the well casing. Existing well sites 3ANW and 3ANE are located in Broward County and have established benchmarks. New photographs and distance to water measurements for these wells are a part of this final report.

All services performed for this project were in accordance with Chapter 472 of the Florida Statutes, and under the direction of a Professional Surveyor and Mapper (PSM) registered in the State of Florida.

Project Location-1:

Project Location-1 is located within the northern portion of Broward County and the southern portion of Palm Beach County as represented on the following aerial map showing the approximate location of the well sites and NGS survey control used for this survey.

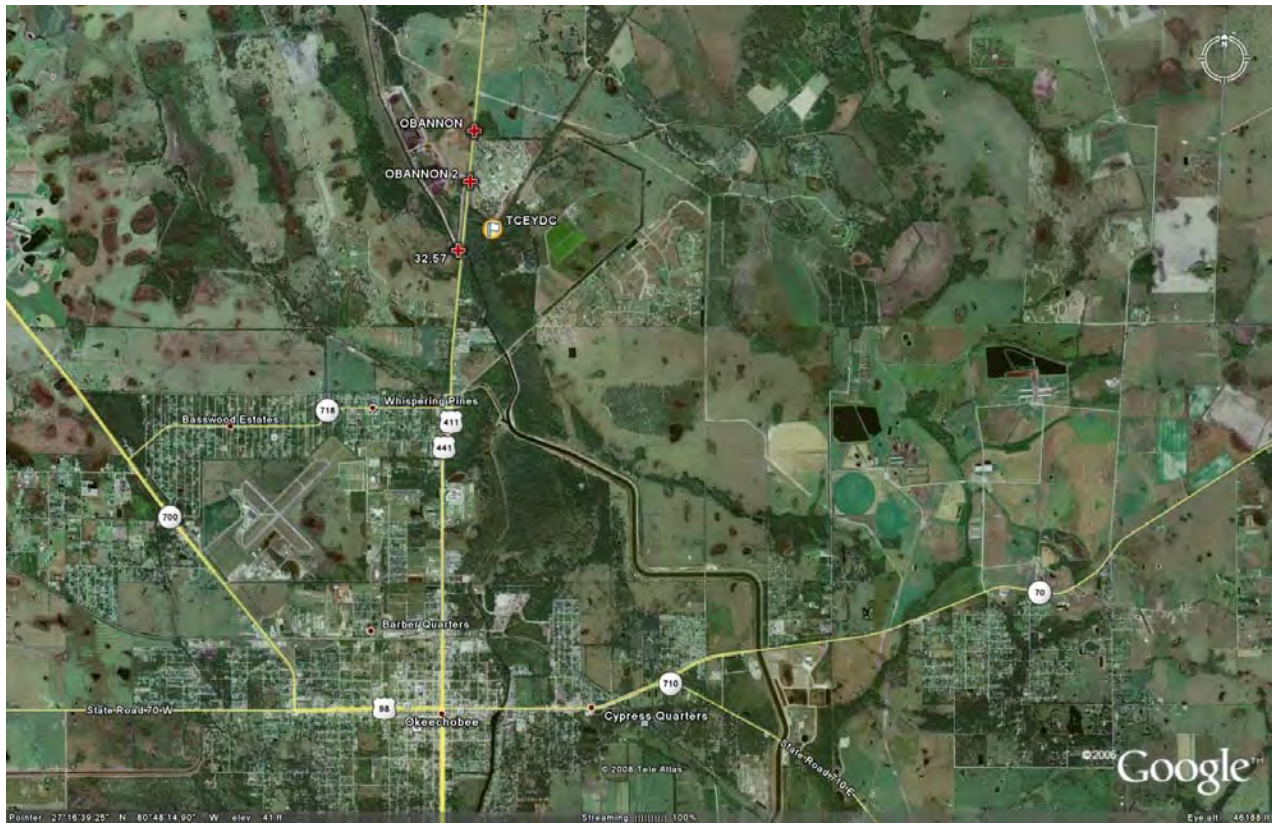
Figure 1: Project Locations – North Broward County and South Palm Beach County



Project Location-2:

Project Location-2 is located within Okeechobee County as represented on the following aerial map showing the approximate location of the well site and NGS survey control used for this survey.

Figure 2: Project Locations - Okeechobee County



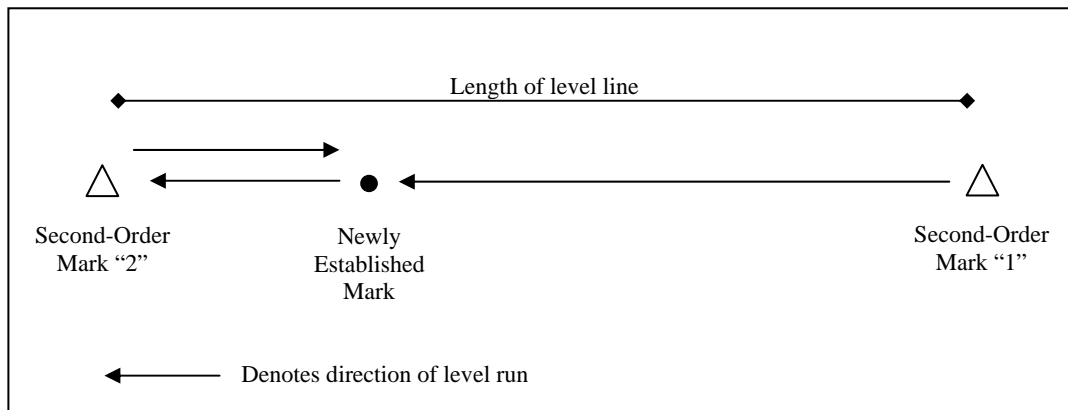
Items Delivered to the Client:

1. A CD containing the following:
 - Two copies of the survey report and one digital version in Microsoft Word format.
 - SFWMD survey control data sheets.
 - Digital photos (named the photo files with the benchmark designations).
 - Scanned copies of field notes.
 - Any other digital files associated with the survey.
 - Completed District benchmark description sheets for all set marks.
2. Bi-weekly contract status reports were delivered previously to Howard Ehmke PSM, Project Manager at ehmke@sfwmd.gov; and Ronnie Hudson, District Field Representative at rhudson@sfwmd.gov during the course of the project. Said contract status reports are not included in this report.

Configuration of Level Runs:

The leveling for the project was performed in accordance with the Federal Geodetic Control Subcommittee standard for Third-Order, Class II geodetic leveling. A brief description of the procedures used follows.

For each level run, two existing NGS First-Order, Class II vertical benchmarks were used. The run was started at one of the benchmarks and closed to a second benchmark. Level loops to the contract control points were then performed, both starting and ending at verified benchmarks.



Equipment Used:

All leveling during this project was performed with a Leica NA2 level and a Philadelphia rod. Information and technical specification for the Leica NA2 level are available at <http://www.leica-geosystems.com>.

Expected Accuracy:

The expected accuracy for all level runs for this project is Third-Order-Class II. This accuracy standard was verified by applying the following formula for checking all level runs: 0.03' times the square root of the length of the level run in miles. All level runs for this project met or exceeded the expected accuracy standard.

Vertical Datum for the Project:

The vertical datum for the project is the NAVD 88. Elevations of the benchmarks are also shown in the NGVD 29. The NGVD 29 elevations shown within this report were established by using the superseded survey control values as depicted on the NSG data sheets for the survey control used to determine the vertical values of the site benchmarks. The all elevation datum is expressed in the U.S. foot unless otherwise stated.

Horizontal Datum for the Project:

The horizontal datum for the project is the North American Datum of 1983, NSRS2007 adjustment (83/07) East Zone.

HORIZONTAL/GPS METHODS

GPS Equipment and Software Used:

Three Trimble 4800 receiver/antenna and one Trimble R8 receiver/antenna (without ground plane) were used for all static sessions.

The GPS baselines were processed and adjusted using (TGO) Trimble Geomatics Office version 1.62.

GPS METHOD:

Due to the remote location within the Holeyland and Rotenberger Wildlife Management Areas and wet conditions due to tropical storm Fay and seasonal rains the sites retained from one foot to four feet of water. Therefore it was determined that a GPS static survey were the only way to efficiently obtain elevations on the proposed new site benchmarks. All sites within the Holeyland and Rotenberger Wildlife Management Areas had to be accessed by airboat. GPS observations for this project were performed in accordance with guidelines for Establishing GPS-Derived Ellipsoid Heights (National Geodetic Survey Technical Memorandum NOS NGS-58)

Mr. Ronnie Taylor the NOAA advisor for the state of Florida was contacted and supplied a mission plan for the GPS static survey to produce final coordinates. Mr. Taylor required two session's per site using two NGS control monuments with occupation time of 1.5 hours and a time separation of 4.0 hours between observations. Calvin, Giordano and Associates occupied three NGS control monuments for each site and observation sessions lasted for 2.0 hours with 4.0 hours between occupation times. These procedures exceeded Mr. Taylor's minimum allowable occupation time.

GPS observations were conducted over six days:

September 19th, 2008
September 24th, 2008
September 25th, 2008
September 29th, 2008
October 1st, 2008
October 6th, 2008

The two observed adjusted values were averaged to check the average closure of the two sessions then compared to the total processed observations to obtain the final elevations of all static surveyed benchmarks. The expected accuracy for the final elevation of site benchmarks at HOLEY, HOLEY1, HOLEY2, ROTTN AND ROTTS is +/-0.10'.

GPS BASELINE PROCESSING AND ADJUSTMENT

Baselines were processed using TGO. Cycle slips within baselines were disabled before processing. For each session, (n-1) baselines were selected that produced fixed integer solutions with the lowest possible RMS values. Baselines were selected to ensure that all set benchmarks had multiple vectors from multiple NGS control stations. NGS control stations S 410 X, V 486, Q 486, N 410 X, T 501, R 535 and BRIDGE2 were used for horizontal and vertical constrained adjustment.

For final coordinates, baseline were processed independently for each session to check redundant measurements and then combined to compute final coordinates. NAD 83 (NSRS2007) NGS Adjustment and NAVD 88 as vertical datum and GEOID03 for geoid were used for final coordinate adjustment.

Well Site 3ANW

Benchmark Information. NGVD29

Found existing benchmark: Stainless steel rod encased in a 6" PVC pipe filled with rock with a 6" SFWMD logo cap and stamped G3ANW 2007 EL. 13.3'

Reference mark: Found brass tag on well deck stamped as follows:

G3ANW W

ELEV. 20.7

DATE 10/4/07

BY K&A

NAVD NGVD29

Average Ground Elevation: = 11.3'

Distance to Water(DTW): from brass tag reference mark: 20.7'-8.1' DTW: El. 12.6'
10/22/2008 at 11:30 AM

Staff Gauge: El. 12.3'

Well Site 3ANE

Benchmark Information. NGVD29

Found existing benchmark: Stainless steel rod encased in a 6" PVC pipe filled with rock with a 6" logo cap and stamped South Florida Water Management District. El. 12.71'

Reference mark: Found ink marker mark on wood well deck.

Existing elevation of marker mark El. 19.09'

CGA established elevation and set brass tag at El. 18.60'

Average Ground Elevation: = 9.9'

Distance to Water(DTW): from brass tag reference mark: 18.61'-6.22' DTW El. 12.39'
10/6/2008 at 3:30 PM

Staff Gauge: El. 12.85' CGA measured El. 12.40'

SURVEYOR'S CERTIFICATION

I hereby certify that this Specific Purpose Survey meets applicable portions of the Minimum Technical Standards set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 61G17, Florida Administrative Code. This report is prepared for the sole and specific use of the South Florida Water Management District and is not assignable.

**Calvin, Giordano & Associates, Inc.
L.B. Number 6791**

**12/09/2008
Last Date of Field Survey**

**By: _____
Jon P. Weber, PSM
Professional Surveyor and Mapper
State of Florida Certificate No. 4323**



10/22/2008



10/22/2008



10/22/2008

2
1
13.0
9
8
7
6
5
4
3

10/22/2008



60
5
4
3
2
1
160
9
8
7
6
5
4
3
2
1
150
9
8
7
6
5
4
3
2
1
0

10/22/2008



10/22/2008



10/22/2008



10/22/2008



RP-2042

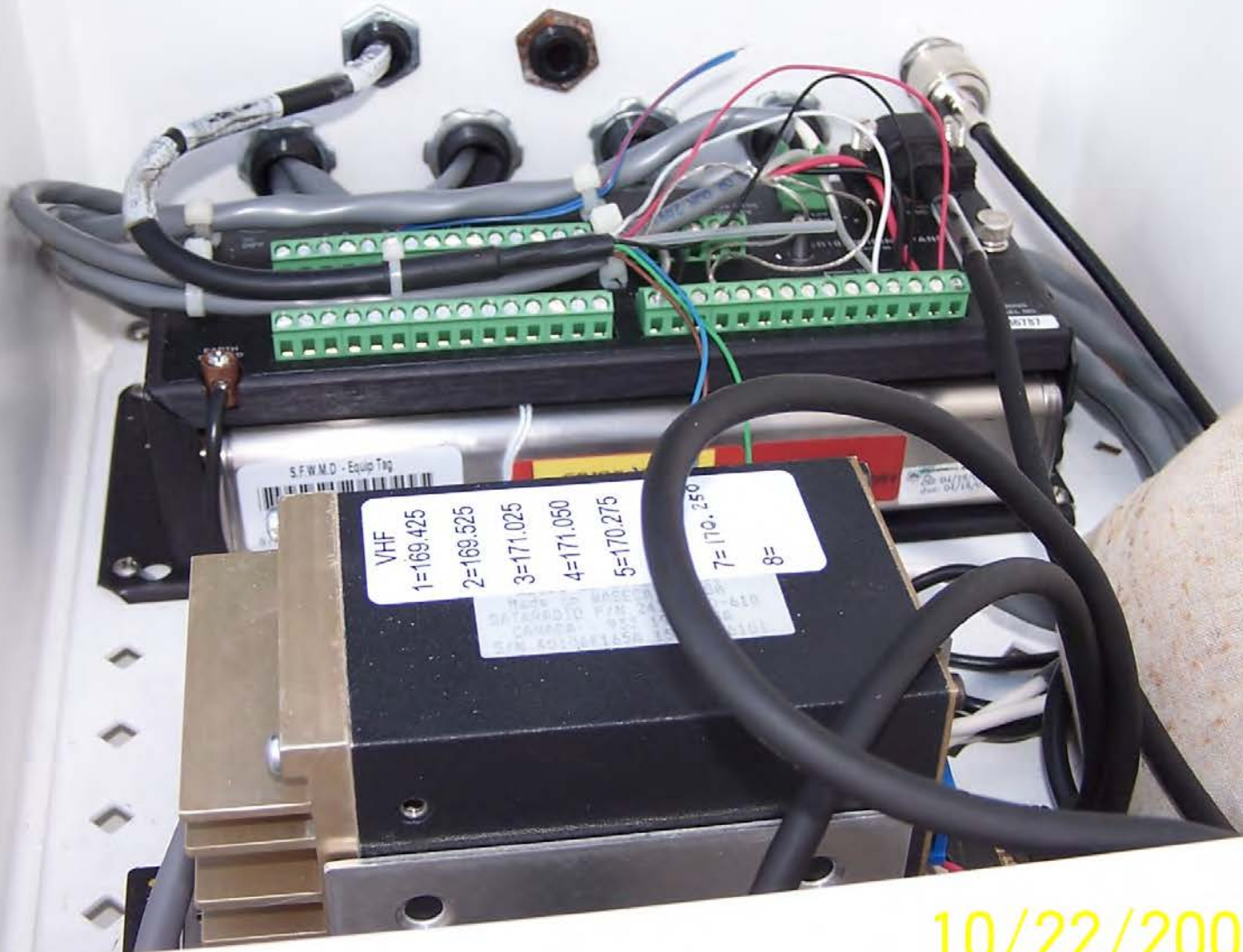
Sealed Rechargeable
Battery
POWER SONIC

MODEL PS-12400 NB
12 Volt 40.0 Amp Hr

Power Sonic Corporation

.45 To NAVD 1928

10/22/2008



VHF
1=169.425
2=169.525
3=171.025
4=171.050
5=170.275
7=170.250
8=

S.F.W.M.D. - Equip Tag

10/22/2008

G 3 A N W

W

ELEV. 20.7

DATE 10/4/07

BY K & A

NAVD

NGVD 29

10/22/2008

3ANW

10/22/2008

T Anderson
Darville
Blake

SFWm D
3 ANW site

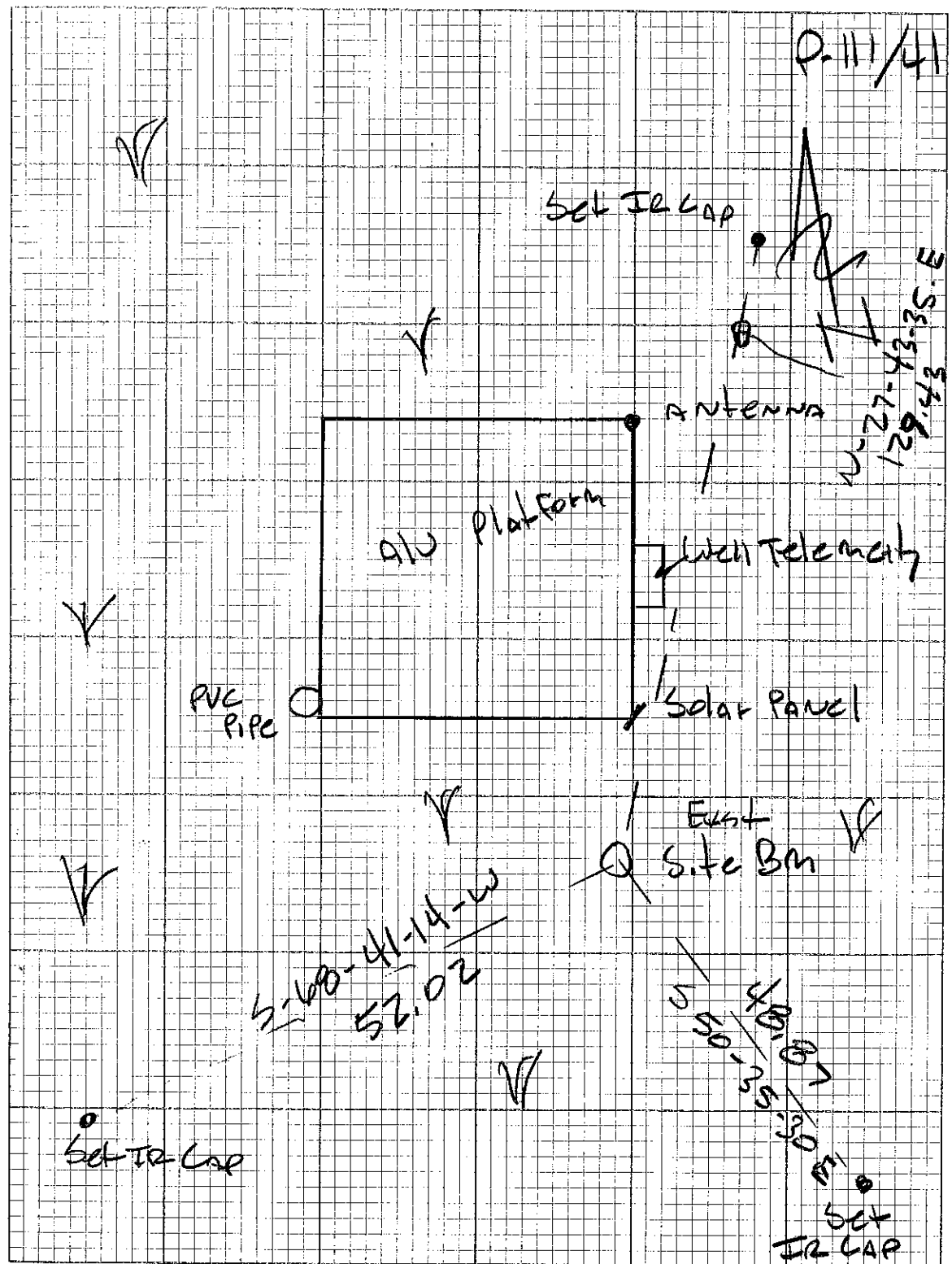
10-22-08
Hot PC

Sta	+	π	-	EL	Desc
	883	22.13		13.30	Exist site Bm 63ANW 2007
Grad stake		10.8	11.3		6 round stake
Brass tag		1.40	20.67		Brass Tag K+A EL = 20.7
Staff Gauge		9.53	12.60		12.30 on mark
	9.88	22.48			
		9.18	13.30		Exist site Bm

Distance to water

$$\begin{array}{r} \text{Brass Tag EL} = 12.7 \\ - \quad \quad \quad 8.1 \\ \hline \text{EL} = 12.6 \end{array}$$

11:30 am 10/22/08





SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 4/01

COUNTY Broward		PROJECT G3ANW Well Site		DESIGNATION "G3ANW 2007"	
SECTION <u>None</u>		TOWNSHIP <u>None</u>		RANGE <u>None</u>	
GEOGRAPHIC INDEX OF QUAD					
Established by <u>Keith and Associates</u>			NAME OF QUADRANGLE <u>Goddens Strand</u>		
SURVEYOR <u>D. Ferels</u> DATE <u>09/10/2007</u>			FIELD BOOKS <u>273</u> PAGE <u>54</u> and <u>279</u> PAGE <u>20</u>		
HORIZONTAL DATUM: 1983/99 ZONE E					
VERTICAL DATUM: NGVD 1929 and NAVD 1988 Benchmark was established by GPS					
CONTROL ACCURACY: HORIZONTAL Third VERTICAL Third					
STATE PLANE COORDINATES		X 728423.2	Y 702587.7	NGVD 1929 EL. <u>13.3'</u> NAVD 1988 EL. <u>11.9'</u>	
LATITUDE <u>26°15'59.1"</u>			LONGITUDE <u>-80°46'46.2"</u>		
DESCRIPTION					
To Reach:					
Benchmark is accessible only by buggy, airboat or helicopter and is located approximately 7.3 miles north of Interstate 75 and 4.7 miles east of Lemon Grove Road (C.R. 833). The benchmark is a stainless steel rod driven to refusal at a depth of 10' ± encased in a 6" PVC pipe backfilled with rock with a 6" logo cap glued atop and stamped G3ANW 2007.					
The benchmark and PVC pipe are located 8.0' east of the S.E. corner of the well platform and 5.7' S.W. of the staff gauge.					
Notable Land marks:					

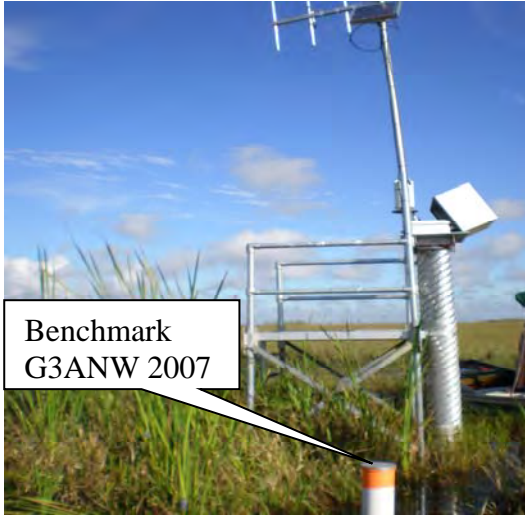
SKETCH

See Attached photos.



SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 4/01



Benchmark
G3ANW 2007





3ANE

10/06/2008



10/06/2008



10/06/2008



10/06/2008



10/06/2008



EST. FLORIDA WATER

MANAGEMENT DISTRICT

10/06/2008



10/06/2008



10/06/2008



10/06/2008

2677



HUMIDITY INDICATOR
MS20003-2
EXAMINE
ITEM
IF PINK
CHANGE
DESICCANT
IF PINK
WARNING
IF PINK

50
40
30

DL-3400
DL-3400
DL-3400
DL-3400

10/06/2008

3 ANE

10/06/2008



Sealed Rechargeable
Battery
POWER SONIC
MODEL PS-12400 NB
12 Volt 40.5Amp.Hr.
9A

HUMIDITY INDICATOR
MOISTURE EXPOSED ITEM
CHANGE OR REPLACE IF PINK
WARNING IF PINK

VANE 18.50 W
REV 10/08/08
REV 10/08/08
HARD NGVD

10/06/2008

3ANE

W

ELEV. 18.60

DATE 10/06/08

BY CGA

NAVD

NGVD 29

10/06/2008



SRV
REV 10/06/08
R100 A

10/06/2008

SANE W
ELEV. 18.60
DATE 10/06/08
BY CGA
NAVD NGVD29

10/06/2008



Small metal label with illegible text, possibly "CAMPBELL SCIENTIFIC".

10/06/2008

3ANE W
ELEV. 18.60
DATE 10/06/08
BY CGA
NAVD NGVD29

10/06/2008

3ANE

W

ELEV. 18.60

DATE 10/06/08

BY CGA

NAVD

NGVD29

10/06/2008



09/09/2008



09/09/2008



09/09/2008



09/09/2008

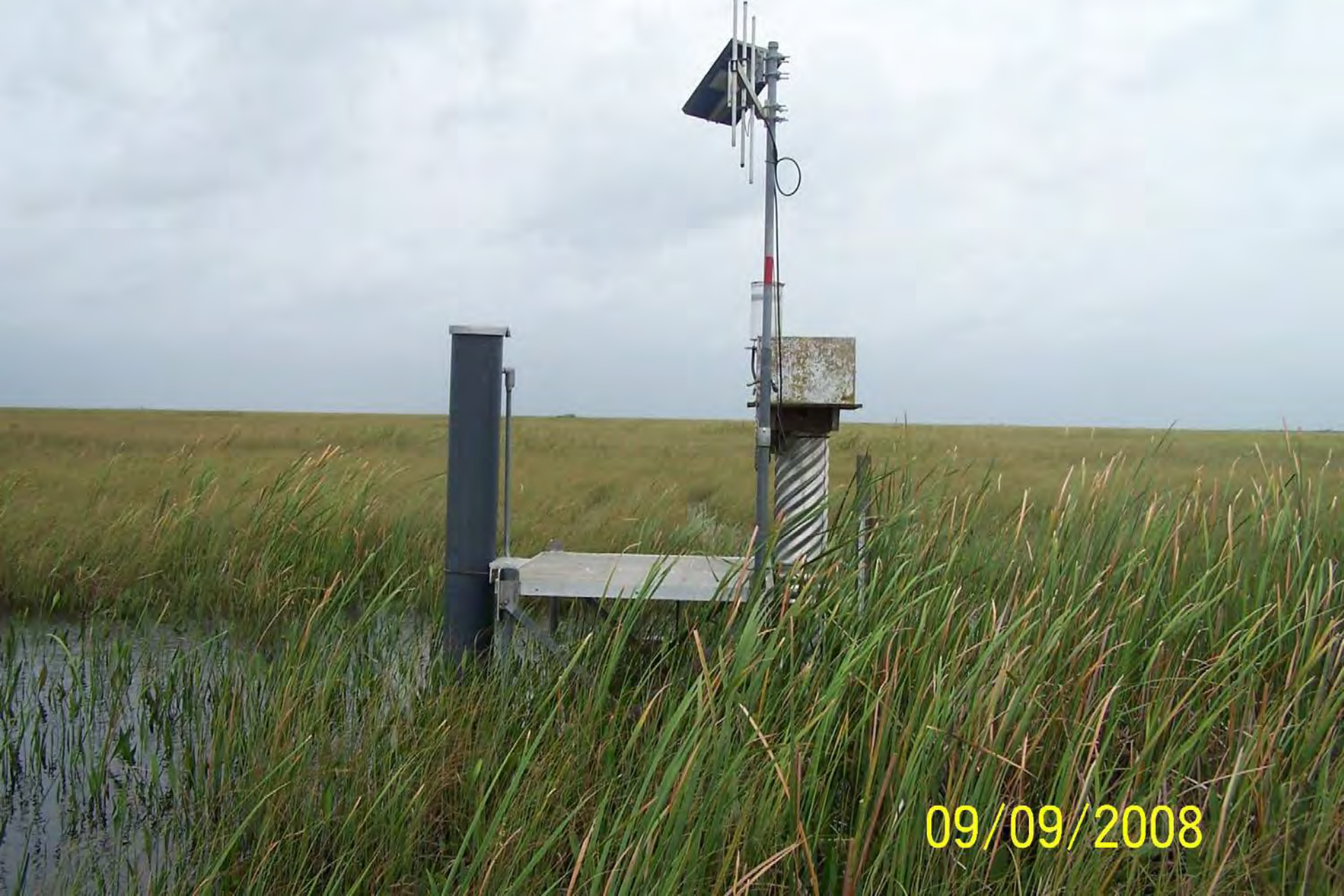


3ANE

09/09/2008



09/09/2008



09/09/2008



09/09/2008



R.P.

Hydrogagage,

19.09

Inc.

9:2:00



09/09/2008

HUMIDITY INDICATOR
MS20003-2
EXAMINE
ITEM
IF PINK
CHANGE
DESICCANT
IF PINK
WARNING
IF PINK
Humidity Caps. Color Code
50
40
30
INDICATED BY HUMIDITY INDICATOR
MADE IN ITALY - PRODUCT

DL-3400
0799
\$16.95
AL IP
PROCELAN PORT
RJ45
RJ45
RJ45

Model: DL-3400
Manufacturer: DL-3400
Made in USA
Serial No. 1581-1111
Date: 11/11/07

Am 28.2.0
7.0.0

CR10
MADE IN USA
RING PANEL NO.

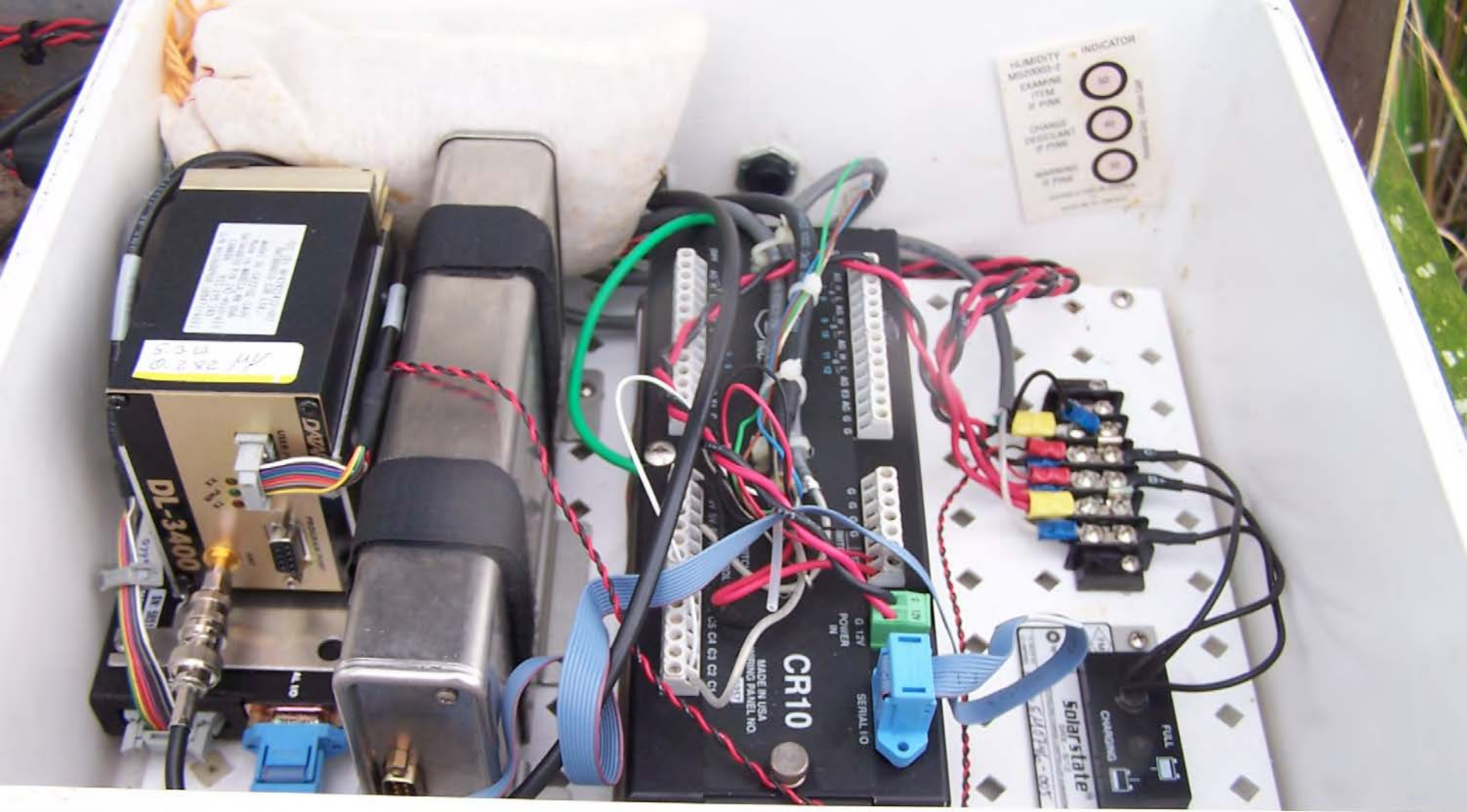
CR10
MADE IN USA
RING PANEL NO.

POWER IN
G 12V
SERIAL I/O
G 12V

US C1 C2 C3 C4
G G G
1 2 3 4 5 6 7 8 9 10 11 12

solartate
CHARGING
FULL
5.2V 6.3V - 0.05V

09/09/2008



09/09/2008



Sealed Recharge
Battery
POWERPSONIC
MODEL: PS-12400 WB
12 Volt 40 Amp-Hr

09/09/2008



Special for Longshore
Batteries
POWER SONIC
MODEL PB-12455 55
12 Volt 55 Amp Hour
55

09/09/2008



09/09/2008



09/09/2008



09/09/2008



09/09/2008



09/09/2008

SANE

09/09/2008



10/06/2008



10/06/2008



10/06/2008



10/06/2008



10/06/2008



3ANE

10/06/2008

Tandemarc
H Parville
R Uke

SFLWD
3ANE
Well site

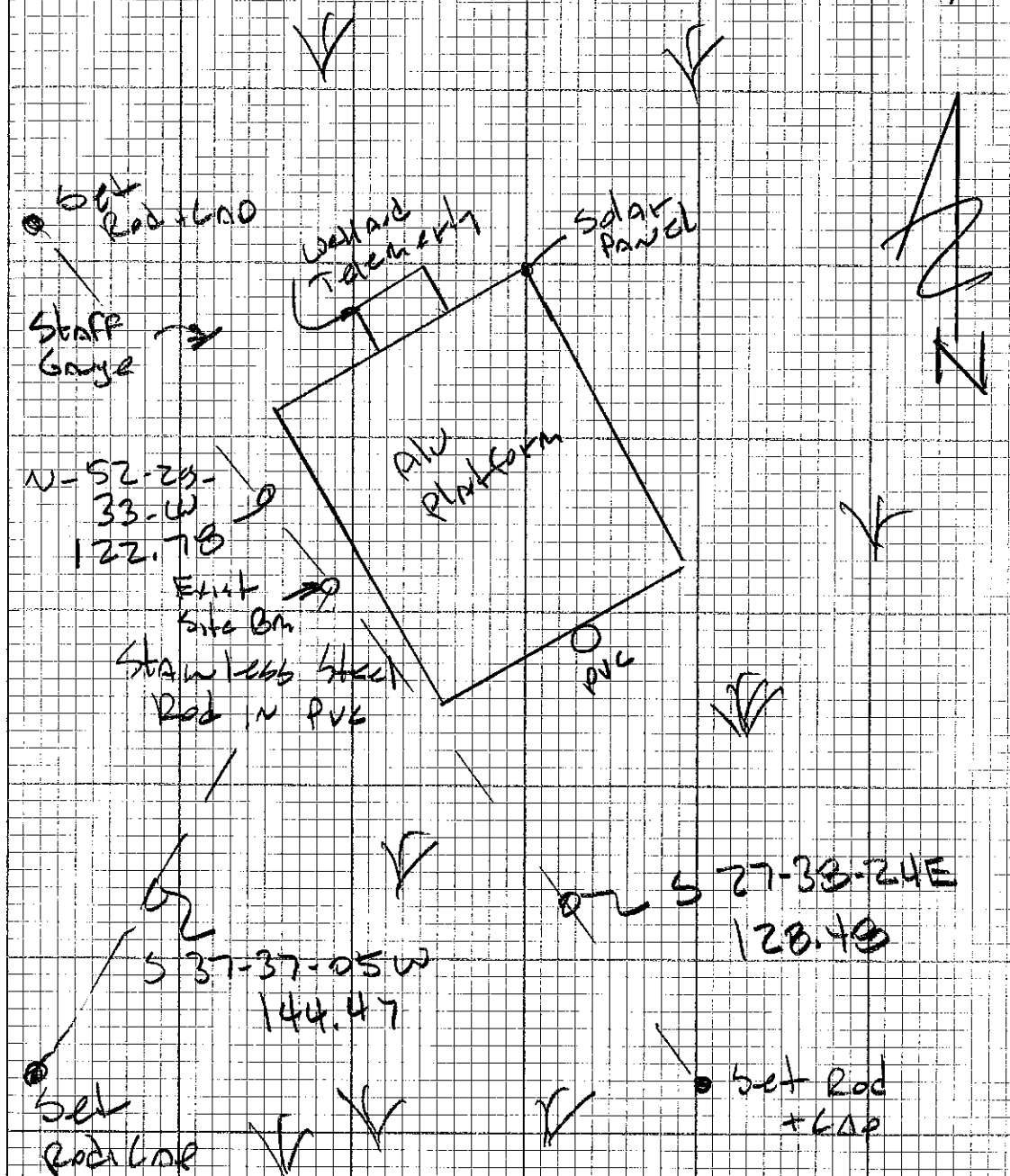
10/6/08
Hot 90°

Sta	+	-	EL	Desc
	744	20.15	12.71	End Exit site Bm
Avg Grade		19.3	9.9	Ground slot
Staff Gauge		7.75	12.40	Water EL 12.85 on gauge
		1.54	18.61	Marker mark 19.09 written
	1.72	20.33		
		7.62	12.71	Site Bm

Dist To water = 18.61 Brass Tag
 - 6.22

 12.39
 Water EL =
 3:30 PM
 10/6/08

0.11/42





SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 4/01

COUNTY BROWARD	PROJECT Hydrology – Everglades Wells	DESIGNATION 3ANE
SECTION 14	TOWNSHIP 48 SOUTH	RANGE 37 EAST
GEOGRAPHIC INDEX OF QUAD		
Established by <u>Nick Miller Inc.</u> Recovered by	NAME OF QUADRANGLE DEEM CITY	
SURVEYOR <u>Stephen M. Gordon</u> DATE <u>09/14/2006</u>	FIELD BOOK _____ 16 _____ PAGE <u>20</u>	
HORIZONTAL DATUM: 1927 <u>1983</u> Other _____ (circle one) ZONE <u>E</u> or W		
STATE PLANE COORDINATES	E 782,513 ft	N 703,610 ft
LATITUDE: N 26.26889°	LONGITUDE: W 80.61455°	
VERTICAL DATUM: MSL 1929 <u>1988</u> Other _____ (circle one)	EL. 11.25 ft	
VERTICAL DATUM: MSL <u>1929</u> 1988 Other _____ (circle one)	EL. 12.71 ft	
CONTROL ACCURACY: HORIZONTAL 1 2 3 <u>SUB-METER</u> (circle one) VERTICAL 1 2 <u>3</u>		
DESCRIPTION		
<p>To Reach:</p> <p>FROM THE JUNCTION OF US 27 AND INTERSTATE 75. GO NORTH ON US 27 FOR 2.5 MILES TO AIRBOAT TOUR FACILITY ON RIGHT. GO EAST FOR +/-450 FEET TO BOAT RAMPS. FROM BOAT RAMPS HEAD 12.15 MILES BY AIRBOAT AT AN AZIMUTH OF 300° 48' 24" TO MARK. LOCATED 4.6 FEET SOUTHWEST OF CORRIGATED PIPE FOR MONITORING WELL, 0.55 FEET WEST OF THE WEST EDGE OF PLATFORM, AND IS RECESSED 2.5 FEET BELOW PLATFORM. MAGNET PLACED INSIDE 6 INCH PVC CASING. ROD DEPTH IS 15.12 FEET.</p> <p>"3ANE" IS A SOUTH FLORIDA WATER MANAGEMENT DISTRICT (SFWMD) 9/16 INCH STAINLESS STEEL ROD SET INSIDE A 6 INCH PVC PIPE ENCLOSURE COVERED WITH AN ACCESS HATCH.</p> <p>Benchmarks Used: N 410 X, Z 497, U 501, FLGPS 64 AZ MK</p> <p>Notable Land marks:</p>		



SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 4/01

SKETCH

1078.010

STAINLESS STEEL ROD SFWMD
SET TO REFUSAL
3ANE STILLING WELL

1078-010
BOOK 16
PT. 6TH 2006
LOUDY SFWMD-16

- MONUMENT SET TO REFUSAL @ 15.12 FT.

- COORDINATES TO 3ANE MONUMENT
LAT: 26° 16' 07.92"
LONG: 80° 36' 52.37"

- COORDINATES TO 3ANE STILLING WELL
LAT: 26° 16' 07.92"
LONG: 80° 36' 52.37"

- MONUMENT SET 4.6 FT. SW OF STILLING WELL;
" " " 2.5 FT. BELOW PLATFORM
" " " 0.52 FT. SW OF PLATFORM

- PICTURE #S 101-0050, 52, 53, 54, 55, 56, 57, 58

- STAFF GAUGE @ 11:30 AM @ 10:30 AM

- ROD RECESSED 0.8' AND A MAGNET
WAS SET INSIDE LOGO CAP.

