PROFESSIONAL SURVEYORS & MAPPERS
INCORPORATED

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SURVEYOR'S REPORT

Specific Purpose Survey of the United States
Geological Survey Well **OSF-92**
in
Osceola County, Florida

Prepared for:
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

Prepared by:
Peter Andersen, PSM, Vice President
Florida Professional Surveyor and Mapper
License Number 5199
State of Florida

GCY, Inc. LB 4108
PO Box 1469/1505 SW Martin Highway
Palm City, Florida 33491/33490
772-286-8083

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PURPOSE

The Purpose of this survey is to set an Elevation Referenced Mark (Benchmark) using the guidelines for a National Geodetic Survey (NGS), Class "C" concrete monument and to establish a North American Vertical Datum of 1988 (NAVD 88) on said Benchmark and on an additional Reference Point with a Brass Plate, both at United States Geological Survey Well **"OSF-92"**.

LOCATION OF PROJECT

The United States Geological Survey Well **"OSF-92"** is located in the Section 26, Township 25 South, Range 33 East, Osceola County, Florida.

General Location (Not to Scale)

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PROJECT VERTICAL DATUM

The project vertical datum is the North American Vertical Datum (NAVD) of 1988.

To convert the NAVD 88 elevation to the National Geodetic Vertical Datum (NGVD) of 1929 at **Station OSF-92 add 1.198.** These values are based on Corpscon 6.0.1, a U.S. Army Corps of Engineers, Engineering Research and Development Center Windows based program to convert coordinates and elevations between datums using the updated vertcon05.txt and the vertcone.05 files supplied by the U.S Army Corps of Engineers. South Atlantic Division, Jacksonville, Florida.

PROJECT HORIZONTAL DATUM

The project horizontal datum is the State Plane Coordinate System, Florida East Zone, North American Datum 83, adjustment of 2011.

LEVELING METHODS

The leveling for this project was performed in accordance with standard survey practice using conventional third order methods, techniques and equipment.
The allowable error on this project meets or exceeds closures as required by SFWMD (.02 √ miles).
Leveling was run from National Geodetic Survey (NGS) monument "CR 532 G" (NGSPID AK7377) to the site benchmarks and closing on National Geodetic Survey (NGS) monument "CR 532 G" (NGSPID AK7377). Leveling was done using a TOPCON AT-G2 Auto Level.

GPS METHODS

Latitude and longitude for the New Benchmark "OSF-92" were established by observing a 6+ hour Static Session on July 16, 2020 using a Trimble 5700 dual frequency receiver S/N 0220381397. The data from this session was sent to the NGS "OPUS" site for post processing on August 25, 2020 and a report was received from the "OPUS" site the same day. The data was also sent to "OPUS Shared" and accepted on August 27, 2020, (NGSPID BBGY02).

Surveyors' Notes:

1. All measurements herein are in United States Survey feet and decimal thereof, unless otherwise specified.
2. Underground utilities were not located as part of this survey.
3. This survey report or copies thereof are not valid without the original signature and seal of a Florida licensed Surveyor and Mapper.
4. Additions or deletions to this survey report by other than the signing party (or parties) is prohibited without written consent of the signing party (or parties).
5. To convert from NAVD 88 to NGVD 29 add 1.198 feet. This value is based on Corpscon 6.0.1 a U.S. Army Corps of Engineers Engineering Research and Development Center Topographic Engineering Center Alexandria, Virginia Windows-based program to convert coordinates and elevations between datum's using vertcon05.txt and vertcon05.05 files supplied by the U.S. Army Corps of Engineers South Atlantic Division, Jacksonville Fl.
6. Date of last field work: July 16, 2020, GCY Job No. 20-1017-02-01.
7. SFWMD Data records (on file at the District's headquarters):

A. Electronic Data files:

Miscellaneous picture files

Digital level run

File names: XXXXXX.DAT

B. Conventional reporting

Field Book: 1869 pages 17-20,25

SURVEYOR'S CERTIFICATION

In my professional opinion this Specific Purpose Survey meets applicable portions of the Standards of Practice set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 5J-17, Florida Administrative Code. This report is prepared for the sole and specific use of the South Florida Water Management District and is not assignable.

July 16, 2020

Last date of Surve

Peter Andersen, PSM

Digitally signed by Peter Andersen, PSM
Date: 2020.09.16 11:02:06 -04'00'

Peter Andersen, PSM, Vice President
Florida Professional Surveyor and Mapper
License Number 5199
State of Florida
GCY, Inc. LB No 4108

NOTE:
This is an electronically signed and sealed document pursuant to Chapter 5J-17.062, Florida Administrative Code. The printed survey map or report or copies thereof are not valid without the original signature and seal of a Florida licensed surveyor or mapper.

PROFESSIONAL SURVEYORS & MAPPERS
INCORPORATED

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 1/19

U.S.G.S. Station Name: **OSF-92**	U.S.G.S. Station Number: 281630080591001	Agency: **GCY, INC.**	Date of Field Work: **7/16/2020**
Party Chief: LAPOLLA	Field Book: **GCY 1869**	Page(s): **17-20, 25**	Report Prepared by: ANDERSEN

SITE SPECIFIC DATA			
Site Benchmark: **OSF-92**	Benchmark Elevation(s) *(NAVD88)*: **60.162**	Corpscon 6.0.1 Conversion Factor (*NAVD88 to NGVD29*) **+ 1.198**	
Well Reference Elevation (*NAVD88*): 59.285	DTW: **38.29** 7/14/2020 13:33PM	Ground Elevation *(NAVD88)*: **60.0**	Pad Elevation (*NAVD88*): **N/A**

GEOGRAPHIC DATA		
Section **26**	Township **25 S**	Range **33 E**
Well Latitude: **28° 16’ 29.869" N**	Well Longitude: **80° 59 08.446" W**	Location Source: **RTK GPS**
State Plane Coordinates:	Northing (Y) = 1432671.66	Easting (X) = 660776.02

Notes: **NAVD88** – North American Vertical Datum of 1988; **NGVD29**- National Geodetic Vertical Datum of 1929; **Corpscon 6.0.1** - A U.S. Army Corps of Engineers Engineering Research and Development Center Topographic Engineering Center Alexandria, Virginia Windows-based program to convert coordinates and elevations between datum's using vertcon05.txt and vertcon05.05 files supplied by the U.S. Army Corps of Engineers South Atlantic Division, Jacksonville Fl.

PICTURES

Aerial of Overall Well Site

Not to scale (GoogleEarth product)

Well Site and Well Head

Well: "OSF-92"
Reference Point: MAGIC MARKER BOX

Reference Point El. = **59.29 feet NAVD88**

Distance to Water =38.29 **feet** from reference point 7/14/2020 @13.33

New Aluminum Tag

USGS RMs-NONE

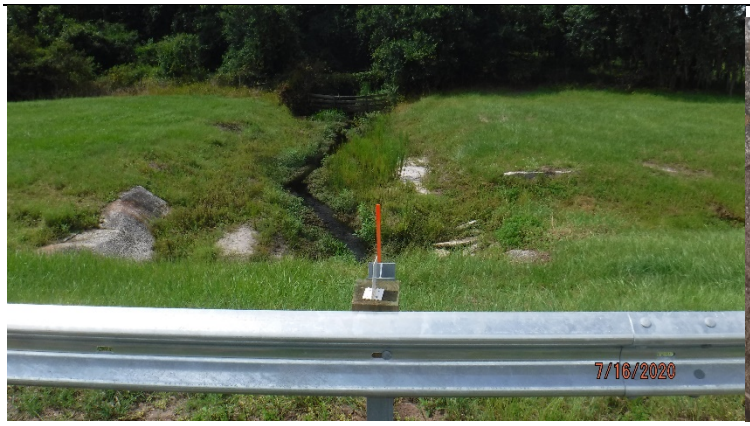
Site Benchmark

Site Benchmark Overall Photo

Site BM: OSF-92

Latitude**: 28° 16' 29.91533**" N
Longitude: **80° 559' 09.04258**" W
NAVD88 EL = 60.162'

Source Benchmarks



CR 532 G (NGSPID AK7377)

The NGS Data Sheet

See file dsdata.pdf for more information about the datasheet.

```
PROGRAM = datasheet95, VERSION = 8.12.5.9
Starting Datasheet Retrieval...
1        National Geodetic Survey,   Retrieval Date = AUGUST 30, 2020
 AK7377 ***********************************************************************
 AK7377  DESIGNATION -  CR 532 G
 AK7377  PID         -  AK7377
 AK7377  STATE/COUNTY-  FL/OSCEOLA
 AK7377  COUNTRY     -  US
 AK7377  USGS QUAD   -  LAKE POINSETT SW (2018)
 AK7377
 AK7377                         *CURRENT SURVEY CONTROL
 AK7377  ______________________________________________________________________
 AK7377* NAD 83(1986) POSITION- 28 16 31.     (N) 080 59 11.     (W)   SCALED
 AK7377* NAVD 88 ORTHO HEIGHT -    18.718 (meters)       61.41  (feet) ADJUSTED
 AK7377  ______________________________________________________________________
 AK7377  GEOID HEIGHT    -        -28.168 (meters)                     GEOID18
 AK7377  DYNAMIC HEIGHT  -         18.690 (meters)       61.32  (feet) COMP
 AK7377  MODELED GRAVITY -    979,172.3   (mgal)                       NAVD 88
 AK7377
 AK7377  VERT ORDER      -  SECOND    CLASS I
 AK7377
 AK7377.The horizontal coordinates were scaled from a map and have
 AK7377.an estimated accuracy of +/- 6 seconds.
 AK7377.
 AK7377.The orthometric height was determined by differential leveling and
 AK7377.adjusted by the NATIONAL GEODETIC SURVEY
 AK7377.in December 1995.
 AK7377
 AK7377.Significant digits in the geoid height do not necessarily reflect accuracy.
 AK7377.GEOID18 height accuracy estimate available here.
 AK7377
 AK7377.Click photographs - Photos may exist for this station.
 AK7377
 AK7377.The dynamic height is computed by dividing the NAVD 88
 AK7377.geopotential number by the normal gravity value computed on the
 AK7377.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 AK7377.degrees latitude (g = 980.6199 gals.).
 AK7377
 AK7377.The modeled gravity was interpolated from observed gravity values.
 AK7377
 AK7377;                   North         East     Units  Estimated Accuracy
 AK7377;SPC FL E     -   436,710.      201,340.      MT  (+/- 180 meters Scaled)
 AK7377
 AK7377_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RNM013276(NAD 83)
 AK7377
 AK7377                           SUPERSEDED SURVEY CONTROL
 AK7377
 AK7377.No superseded survey control is available for this station.
 AK7377
 AK7377_MARKER: DD = SURVEY DISK
 AK7377_SETTING: 32 = SET IN A RETAINING WALL OR CONCRETE LEDGE
 AK7377_SP_SET: HEADWALL
 AK7377_STAMPING: CR 532 G DNR 62.43
 AK7377_MARK LOGO: FLHD
 AK7377_MAGNETIC: O = OTHER; SEE DESCRIPTION
 AK7377_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AK7377+STABILITY: SURFACE MOTION
 AK7377_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
```

"CR 532 G" Benchmark Datasheet (2 OF 2)

```
AK7377+SATELLITE: SATELLITE OBSERVATIONS - December 18, 2002
AK7377
AK7377  HISTORY     - Date     Condition        Report By
AK7377  HISTORY     - UNK      MONUMENTED       FLDNR
AK7377  HISTORY     - 19920726 GOOD             FLDNR
AK7377  HISTORY     - 20021218 GOOD             FLDEP
AK7377
AK7377                          STATION DESCRIPTION
AK7377
AK7377'DESCRIBED BY FL DEPT OF NAT RES 1992
AK7377'THE MARK IS ABOUT 16.8 MI (27.0 KM)  WEST OF COCOA, IN SECTION 35,
AK7377'TOWNSHIP 25 SOUTH, RANGE 33 EAST.
AK7377'TO REACH THE MARK FROM THE INTERSECTION OF U.S. HIGHWAY 1 AND STATE
AK7377'ROAD 520 IN COCOA, GO WEST ON STATE ROAD 520 FOR 3.8 MI (6.1 KM)  TO
AK7377'THE INTERSECTION OF U.S. INTERSTATE 95 AND STATE ROAD 520, CONTINUE
AK7377'WEST ON STATE ROAD 520 FOR  1.85 MI (2.98 KM)  TO THE JUNCTION OF
AK7377'STATE ROAD 524, CONTINUE WEST ON STATE ROAD 520 FOR 2.95 MI
AK7377'(4.75 KM)  TO THE ST. JOHNS RIVER BRIDGE, CONTINUE WEST ON STATE ROAD
AK7377'520 FOR 3.05 MI (4.91 KM)  TO THE JUNCTION OF COUNTY ROAD 532, TURN
AK7377'LEFT AND GO SOUTHERLY ON COUNTY ROAD 532 FOR 2.55 MI (4.10 KM)  TO
AK7377'THE ORANGE AND OSCEOLA COUNTY LINE, CONTINUE SOUTHERLY ON COUNTY ROAD
AK7377'532 FOR 5.60 MI (9.01 KM)  TO A LONG CURVE LEADING WESTERLY, CONTINUE
AK7377'WEST ON COUNTY ROAD 532 FOR 4.40 MI (7.08 KM)  TO THE MARK ON THE
AK7377'LEFT, SET IN THE SOUTH SIDE OF A 41.0 FT (12.5 M)  LONG HEADWALL FOR
AK7377'A BOX CULVERT, 4.0 FT (1.2 M)  BELOW THE LEVEL OF THE HIGHWAY.
AK7377'LOCATED 38.6 FT (11.8 M)  WEST-NORTHWEST OF POWER POLE NUMBER 6-71302,
AK7377'37.5 FT (11.4 M)  SOUTH OF THE CENTERLINE OF COUNTY ROAD 532, 26.0 FT
AK7377'(7.9 M)  WEST OF THE EAST END OF THE HEADWALL, 15.5 FT (4.7 M)  SOUTH
AK7377'OF THE METAL GUARDRAIL AND 15.0 FT (4.6 M)  EAST OF THE WEST END OF
AK7377'THE HEADWALL.
AK7377
AK7377                          STATION RECOVERY (2002)
AK7377
AK7377'RECOVERY NOTE BY FL DEPT OF ENV PRO 2002 (JLM)
AK7377'THE MARK IS ABOUT 15.6 MI SOUTHWEST OF COCOA, 15.0 MI EAST-NORTHEAST
AK7377'OF ST. CLOUD, 13.5 MI  NORTHEAST OF ASHTON, IN SECTION 35, TOWNSHIP 25
AK7377'SOUTH, RANGE 33 EAST.
AK7377'
AK7377'TO REACH THE MARK FROM THE JUNCTION OF U.S. HIGHWAY 192, 441 (13TH
AK7377'STREET) AND COUNTY  ROAD 523 (VERMONT AVENUE, CANOE CREEK ROAD) IN ST.
AK7377'CLOUD, GO EAST ON U.S. HIGHWAY 192, 441  (13TH STREET, EAST BRONSON
AK7377'HIGHWAY) FOR 3.0 MI TO THE INTERSECTION OF STATE ROAD 15,  CONTINUE
AK7377'EAST ON U.S. HIGHWAY 192, 441 (BRONSON HIGHWAY) FOR 1.25 MI TO THE
AK7377'JUNCTION OF  NOVA ROAD (COUNTY ROAD 532) ON THE LEFT, TURN LEFT ON
AK7377'NOVA ROAD (COUNTY ROAD 532) AND  GO NORTHEAST FOR 3.65 MI TO CANAL
AK7377'C-32C, CONTINUE EAST ON NOVA ROAD FOR 3.1 MI TO THE  WEST END OF
AK7377'BRIDGE NUMBER 924115 OVER ECONLOCKHATCHEE RIVER SWAMP, CONTINUE EAST
AK7377'ON  NOVA ROAD (COUNTY ROAD 532) FOR 7.5 MI TO THE MARK ON THE RIGHT,
AK7377'SET FLUSH IN THE TOP OF A  41.0 FT LONG HEADWALL 4.0 FT BELOW THE
AK7377'LEVEL OF COUNTY ROAD 532 (NOVA ROAD).
AK7377'
AK7377'LOCATED 38.6 FT WEST-NORTHWEST OF POWER POLE NUMBER 6-71302, 37.5 FT
AK7377'SOUTH OF THE  CENTERLINE OF COUNTY ROAD 532 (NOVA ROAD), 26.0 FT WEST
AK7377'OF THE EAST END OF THE HEADWALL,  15.5 FT SOUTH OF THE METAL GUARDRAIL
AK7377'AND 15.0 FT EAST OF THE WEST END OF THE HEADWALL.

*** retrieval complete.
Elapsed Time = 00:00:01
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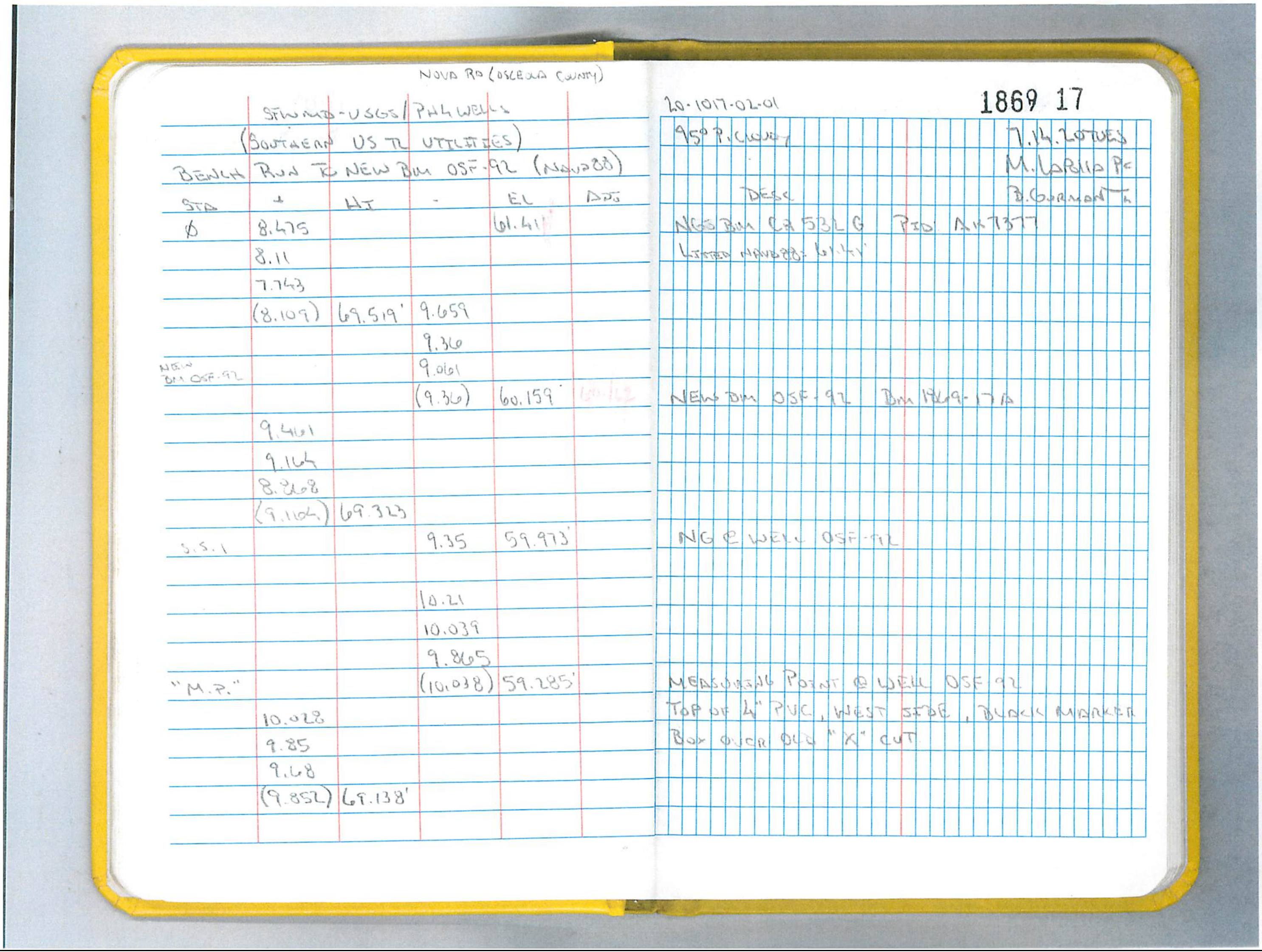
/

Field Notes (1 of 5)



NOVA RD (OSCEOLA COUNTY)

SFWMD-USGS / PHA WELLS
(SOUTHERN US TO UTILITIES)
BENCH RUN TO NEW BM OSF-92 (NAVD88)

STA	+	HI	-	EL	ADJ
Ø	8.475			61.41'	
	8.11				
	7.743				
	(8.109)	69.519'	9.659		
			9.36		
NEW BM OSF-92			9.061		
			(9.36)	60.159'	[illegible]
	9.461				
	9.164				
	8.868				
	(9.164)	69.323			
S.S.1			9.35	59.973'	
			10.21		
			10.039		
			9.865		
"M.P."			(10.038)	59.285'	
	10.028				
	9.85				
	9.68				
	(9.852)	69.138'			

20-1017-02-01

1869 17

95° P. CLOUDY

7.14.20 TUES
M. LaBella PC
B. GORMAN Th

DESC

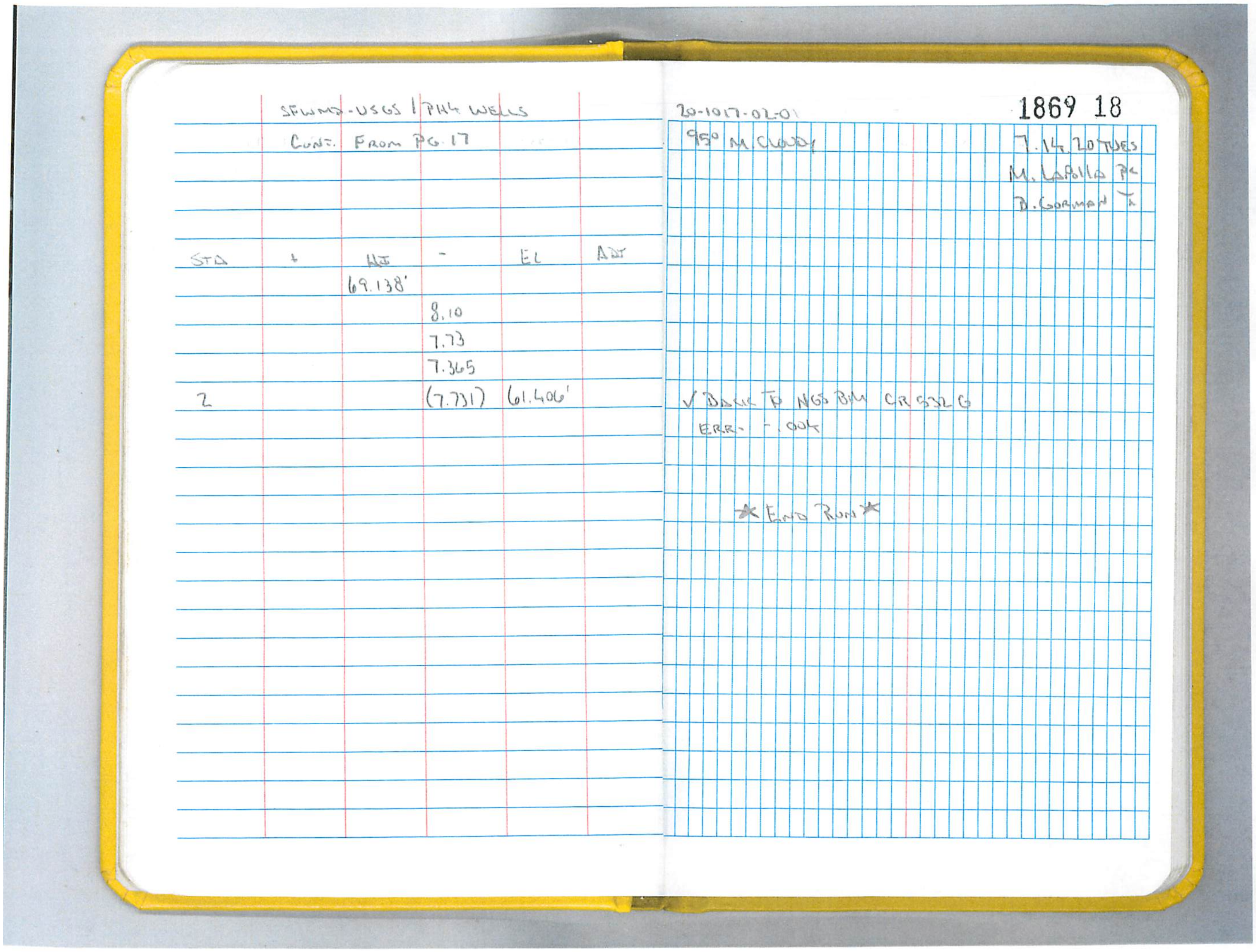
NGS BM CR 532 G PID: AK7377
LISTED NAVD88: 61.41'

NEW BM OSF-92 BM 1869-17A

NG @ WELL OSF-92

MEASURING POINT @ WELL OSF-92
TOP OF 4" PVC, WEST SIDE, BLACK MARKER
BOX OVER OLD "X" CUT

Field Notes (2 of 5)



SFWMD-USGS | PH4 WELLS

CONT. FROM PG. 17

STA	+	HI	-	EL	ADJ
		69.138'			
			8.10		
			7.73		
			7.365		
2			(7.731)	61.406'	

20-1017-02-01

1869 18

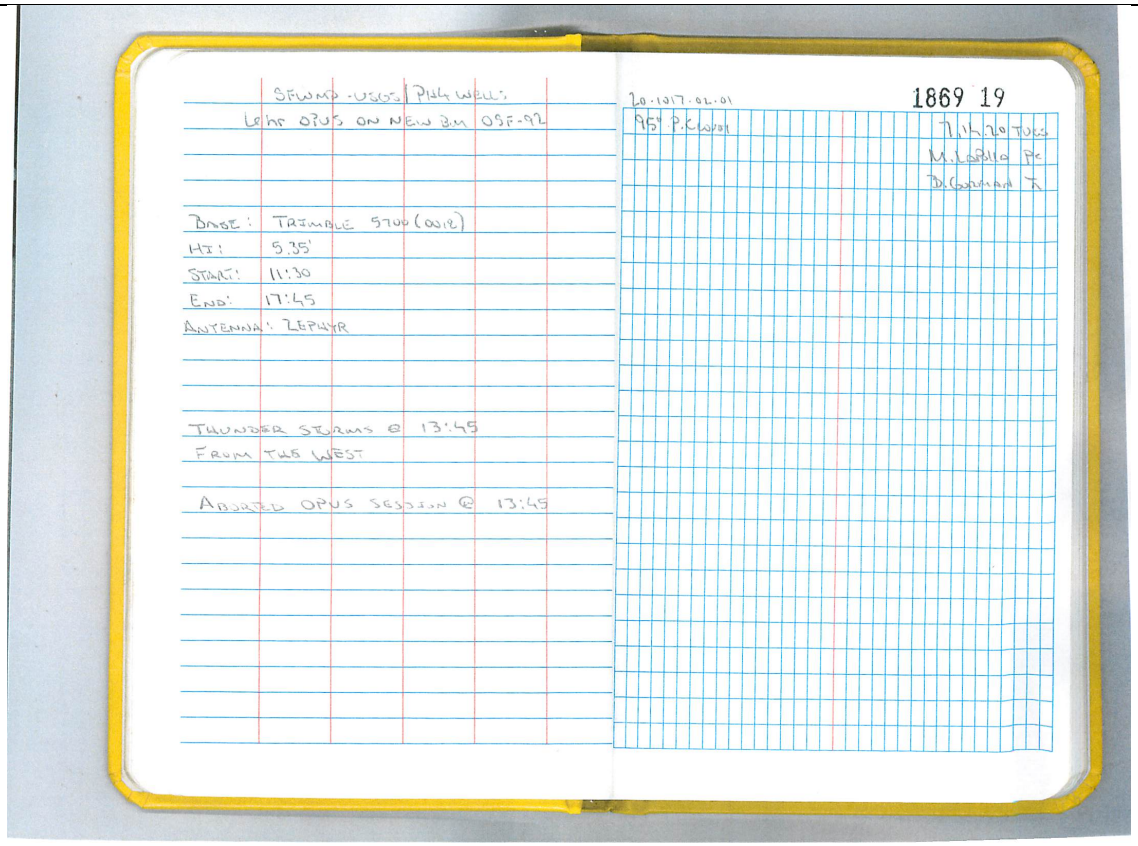
95° M. CLOUDY

7.14.20 TUES
M. LAPOLLA PC
D. GORMAN TA

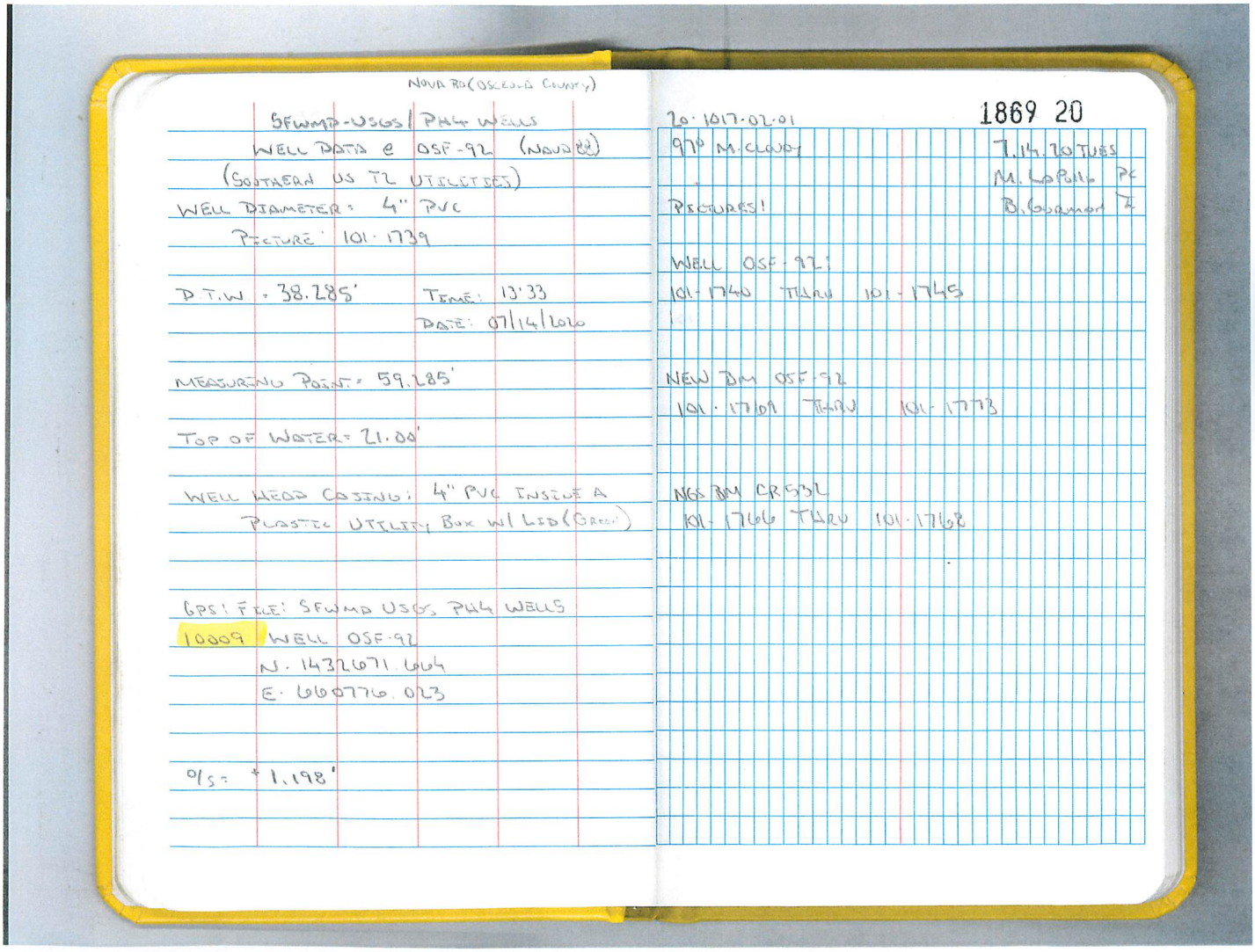
✓ BACK TO NGS BM CR 532 G
ERR- -.004

★ END RUN ★

Field Notes (3 of 5)



Field Notes (4 of 5)



NOVA RD (OSCEOLA COUNTY)

SFWMD-USGS/ PH4 WELLS
WELL DATA @ OSF-92 (NOVA RD)
(SOUTHERN US 192 UTILITIES)
WELL DIAMETER: 4" PVC
PICTURE: 101-1739

D.T.W. = 38.285' TIME: 13:33
DATE: 07/14/2020

MEASURING POINT: 59.285'

TOP OF WATER = 21.00'

WELL HEAD CASING: 4" PVC INSIDE A
PLASTIC UTILITY BOX W/ LID (GRAY)

GPS: FILE: SFWMD USGS PH4 WELLS
10009 WELL OSF-92
N. 1432671.664
E. 660776.023

O/S = +1.198'

20-1017-02-01
970 M. CLOUD
PICTURES!

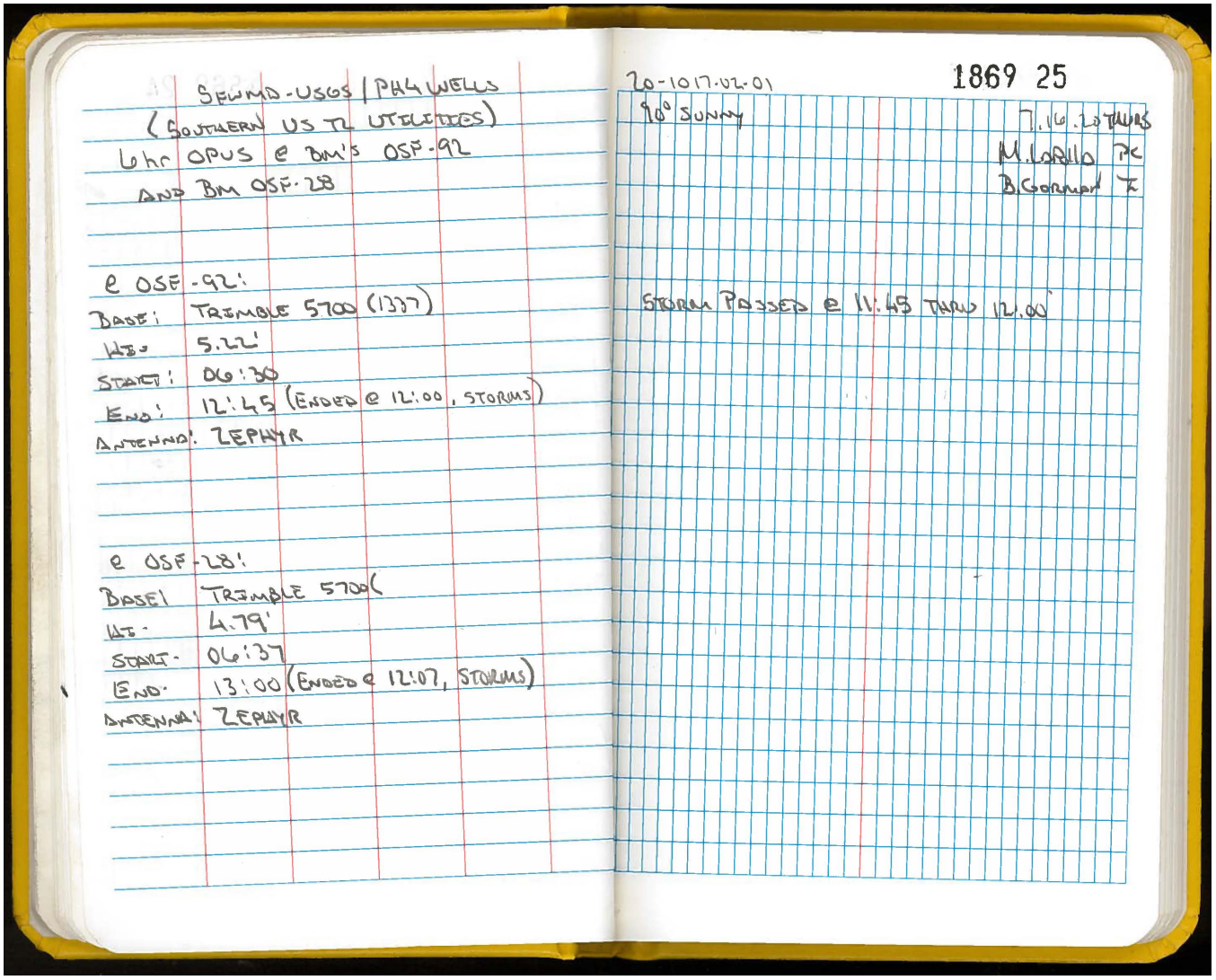
WELL OSF-92:
101-1740 THRU 101-1745

NEW BM OSF 92
101-17709 THRU 101-17713

NGS BM CR5332
101-1766 THRU 101-17668

1869 20
7.14.20 TUES
M. LaPuma PE
B. Gbamoh I

Field Notes (5 of 5)



South Florida Water Management District Benchmark Datasheet

Designation: **OSF-92**	Project Name: **USGS PHASE 4 WELLS**	Type: **V**	State Plane Zone: **FL East**
Stamping: **OSC-28 LB4108 2020**	Field Book Name: **GCY 1869**	Field Book Page: **17-20, 25**	
Established By: **GCY INC**	Recovered By:	Recovery Date:	
Surveyor: **ANDERSEN**	Established Date: **07/16/20**	Status: **New**	

GEOGRAPHIC POSITION INFORMATION

Section: **26**	Township: **25 SOUTH**	Range: **33 EAST**	
County: **OSCEOLA**	Quadrangle: **LAKE POINSETT SW**	Quad Index:	NGS Source BM(s): **CR 532 G**
NAD83 Adj. Year: **2011**	Vertical Datum: **NAVD1988**	Horizontal Datum: **NAD1983**	NGS PID(s): **AK7377**
NAVD88 Elevation (feet): **60.162**	NGVD29 Elevation (feet): **61.36**	2022 Elevation:	NGS NAVD88 Elev (ft): **61.411**
NAVD88 Class: **3rd**	NGVD29 Class: **3rd**	Other Elevation:	NGS NAVD88 Elev (m): **18.718**
NAVD88 Order:	NGVD29 Order:	Other Elevation Type:	NGS 2022 Elev (ft):

CORPSCON 6.0.1 CONVERSION FACTOR (NAVD88 TO NGVD29): (A U.S. Army Corps of Engineers Engineering Research and Development Center Topographic Engineering Center Alexandria, Virginia Windows-based program to convert coordinates and elevations between datum's using vertcon05.txt and vertcon05.05 files supplied by the U.S. Army Corps of Engineers South Atlantic Division, Jacksonville Fl.)

Vertical Datum Offset: + **1.198**	Actual NGS Elevation or ngvd29.txt file:	OPUS Ortho Height: **60.111**	
Northing (Y) (feet): **1432676.36**	Easting (X) (feet): **660722.645**	Source of Latitude & Longitude: **OPUS SOLUTION**	
Latitude: **28** DD°	**16** MM'	**29.91533** SS"	Longitude: **80** DD° **59** MM' **9.04258** SS"
Latitude (Decimal Degrees): **28.27497648**		Longitude (Decimal Degrees): **-80.98584516**	

RECOVERY DATA

How to Reach:	**FROM THE INTERSECTION OF SR 520 AND CR 532, GO SOUTHERLY AND THEN WEST ON CR 532 FOR 11.2 MILES TO THE MARK ON THE RIGHT. MARK IS 14 FT SOUTH OF A R/W FENCE, 79 FT WNW OF THE WEST END OF A CONCRETE HEAD WALL AT A DRAINAGE DITCH CROSSING UNDER CR 532, AND 45 FT NORTH OF THE NORTH EDGE OF PAVEMENT OF CR 532.**
Description/Notes:	

Notable Landmarks:

Other Source Benchmarks:

PICTURES

Aerial View of Overall Site

PICTURES

Site Sketch

Page 1 of 1

From: opus
To: Pete Andersen
Subject: OPUS solution : 13971980.t01 OP1598381768730
Date: Tuesday, August 25, 2020 2:57:47 PM

FILE: 13971980.t01 OP1598381768730

NGS OPUS SOLUTION REPORT
==========

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: https://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: petea@gcyinc.com DATE: August 25, 2020
RINEX FILE: 1397198k.20o TIME: 18:57:31 UTC

SOFTWARE: page5 1801.18 master72.pl 160321 START: 2020/07/16 10:27:00
EPHEMERIS: igs21144.eph [precise] STOP: 2020/07/16 16:01:00
NAV FILE: brdc1980.20n OBS USED: 13661 / 14494 : 94%
ANT NAME: TRM39105.00 NONE # FIXED AMB: 70 / 76 : 92%
ARP HEIGHT: 1.591 OVERALL RMS: 0.019(m)

REF FRAME: NAD_83(2011)(EPOCH:2010.0000) ITRF2014 (EPOCH:2020.5397)

X:	880742.989(m)	0.003(m)	880742.145(m)	0.003(m)
Y:	-5551914.901(m)	0.007(m)	-5551913.339(m)	0.007(m)
Z:	3003372.554(m)	0.005(m)	3003372.398(m)	0.005(m)

LAT:	28 16 29.91533	0.005(m)	28 16 29.93664	0.005(m)
E LON:	279 0 50.95742	0.004(m)	279 0 50.93582	0.004(m)
W LON:	80 59 9.04258	0.004(m)	80 59 9.06418	0.004(m)
EL HGT:	-9.846(m)	0.007(m)	-11.395(m)	0.007(m)
ORTHO HGT:	18.322(m)	0.051(m) [NAVD88 (Computed using GEOID18)]		

	UTM COORDINATES UTM (Zone 17)	STATE PLANE COORDINATES SPC (0901 FL E)
Northing (Y) [meters]	3127663.616	436680.628
Easting (X) [meters]	501388.191	201388.665
Convergence [degrees]	0.00670556	0.00670556
Point Scale	0.99960002	0.99994120
Combined Factor	0.99960157	0.99994275

US NATIONAL GRID DESIGNATOR: 17RNM0138827663(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DH3757	WACH WAUCHULA CORS ARP	N273051.042	W0815256.615	122063.0
DG9757	DLND DELAND CORS ARP	N290322.897	W0811547.480	90744.4
DE9138	OKCB OKEECHOBEE CORS ARP	N271557.715	W0805119.181	112542.9

NEAREST NGS PUBLISHED CONTROL POINT

AK7377	CR 532 G	N281631.000	W0805911.000	62.9

BASE STATION INFORMATION

STATION NAME: wach a 2 (Wauchula; Wauchula, Florida, U.S.A.)
MONUMENT: NO DOMES NUMBER
XYZ 799335.4500 -5604081.2975 2928868.5949 MON @ 2010.0000 (M)
XYZ -0.0116 0.0017 0.0012 VEL (M/YR)
NEU 0.0000 0.0000 0.0000 MON TO ARP (M)
NEU 0.0001 -0.0008 0.1242 ARP TO L1 PHASE CENTER (M)
NEU -0.0000 -0.0008 0.1337 ARP TO L2 PHASE CENTER (M)
XYZ -0.1226 0.0178 0.0122 VEL TIMES 10.5397 YRS
XYZ 0.0000 0.0000 0.0000 MON TO ARP
XYZ 0.0148 -0.1091 0.0575 ARP TO L1 PHASE CENTER
XYZ 799335.3423 -5604081.3888 2928868.6647 L1 PHS CEN @ 2020.5397
XYZ 0.0000 0.0000 0.0000 + XYZ ADJUSTMENTS
XYZ 799335.3423 -5604081.3888 2928868.6647 NEW L1 PHS CEN @ 2020.5397
XYZ 799335.3275 -5604081.2797 2928868.6071 NEW ARP @ 2020.5397
XYZ 799335.3275 -5604081.2797 2928868.6071 NEW MON @ 2020.5397
LLH 27 30 51.06302 278 7 3.36199 9.2829 NEW L1 PHS CEN @ 2020.5397
LLH 27 30 51.06302 278 7 3.36202 9.1587 NEW ARP @ 2020.5397
LLH 27 30 51.06302 278 7 3.36202 9.1587 NEW MON @ 2020.5397

STATION NAME: dlnd a 3 (DELAND; Deland, Florida, U.S.A.)
MONUMENT: NO DOMES NUMBER
XYZ 847548.9489 -5515060.4257 3079363.2140 MON @ 2010.0000 (M)
XYZ -0.0120 0.0012 0.0015 VEL (M/YR)
NEU 0.0000 0.0000 0.0000 MON TO ARP (M)
NEU 0.0001 -0.0008 0.1242 ARP TO L1 PHASE CENTER (M)
NEU -0.0000 -0.0008 0.1337 ARP TO L2 PHASE CENTER (M)
XYZ -0.1269 0.0126 0.0161 VEL TIMES 10.5397 YRS
XYZ 0.0000 0.0000 0.0000 MON TO ARP
XYZ 0.0157 -0.1074 0.0605 ARP TO L1 PHASE CENTER
XYZ 847548.8378 -5515060.5205 3079363.2906 L1 PHS CEN @ 2020.5397
XYZ -0.0000 -0.0000 -0.0000 + XYZ ADJUSTMENTS
XYZ 847548.8378 -5515060.5205 3079363.2906 NEW L1 PHS CEN @ 2020.5397
XYZ 847548.8220 -5515060.4131 3079363.2301 NEW ARP @ 2020.5397
XYZ 847548.8220 -5515060.4131 3079363.2301 NEW MON @ 2020.5397
LLH 29 3 22.91915 278 44 12.49712 -1.1441 NEW L1 PHS CEN @ 2020.5397
LLH 29 3 22.91915 278 44 12.49714 -1.2684 NEW ARP @ 2020.5397
LLH 29 3 22.91915 278 44 12.49714 -1.2684 NEW MON @ 2020.5397

STATION NAME: okcb a 4 (Okeechobee; Okeechobee, Florida, U.S.A.)
MONUMENT: 49587S001
XYZ 901665.5395 -5601320.7260 2904442.8976 MON @ 2010.0000 (M)
XYZ -0.0116 0.0012 0.0016 VEL (M/YR)
NEU 0.0000 0.0000 0.0000 MON TO ARP (M)
NEU 0.0001 -0.0008 0.1242 ARP TO L1 PHASE CENTER (M)
NEU -0.0000 -0.0008 0.1337 ARP TO L2 PHASE CENTER (M)
XYZ -0.1223 0.0122 0.0171 VEL TIMES 10.5397 YRS
XYZ 0.0000 0.0000 0.0000 MON TO ARP
XYZ 0.0168 -0.1091 0.0570 ARP TO L1 PHASE CENTER
XYZ 901665.4340 -5601320.8228 2904442.9717 L1 PHS CEN @ 2020.5397
XYZ 0.0000 0.0000 0.0000 + XYZ ADJUSTMENTS
XYZ 901665.4340 -5601320.8228 2904442.9717 NEW L1 PHS CEN @ 2020.5397

XYZ 901665.4172 -5601320.7137 2904442.9147 NEW ARP @ 2020.5397
XYZ 901665.4172 -5601320.7137 2904442.9147 NEW MON @ 2020.5397
LLH 27 15 57.73631 279 8 40.79744   -15.2075 NEW L1 PHS CEN @ 2020.5397
LLH 27 15 57.73631 279 8 40.79747   -15.3317 NEW ARP @ 2020.5397
LLH 27 15 57.73631 279 8 40.79747   -15.3317 NEW MON @ 2020.5397

REMOTE STATION INFORMATION

STATION NAME: 1397 1
 MONUMENT: NO DOMES NUMBER
XYZ 880742.1187 -5551913.5046 3003372.4247 MON @ 2020.5394 (M)
NEU 0.0003 -0.0005 1.5910 MON TO ARP (M)
NEU -0.0003 0.0005 0.0559 ARP TO L1 PHASE CENTER (M)
NEU -0.0006 0.0016 0.0526 ARP TO L2 PHASE CENTER (M)
XYZ 0.2190 -1.3838 0.7539 MON TO ARP
XYZ 0.0082 -0.0487 0.0262 ARP TO L1 PHASE CENTER
XYZ 880742.3459 -5551914.9371 3003373.2048 L1 PHS CEN @ 2020.5397

BASELINE NAME: wach 1397
XYZ 0.0255 0.1611 -0.0261 + XYZ ADJUSTMENTS
XYZ 880742.3715 -5551914.7759 3003373.1788 NEW L1 PHS CEN @ 2020.5397
XYZ 880742.3633 -5551914.7273 3003373.1526 NEW ARP @ 2020.5397
XYZ 880742.1442 -5551913.3435 3003372.3986 NEW MON @ 2020.5397
LLH 28 16 29.93659 279 0 50.93576   -9.7437 NEW L1 PHS CEN @ 2020.5397
LLH 28 16 29.93660 279 0 50.93574   -9.7996 NEW ARP @ 2020.5397
LLH 28 16 29.93659 279 0 50.93576 -11.3906 NEW MON @ 2020.5397

BASELINE NAME: dlnd 1397
XYZ 0.0255 0.1674 -0.0237 + XYZ ADJUSTMENTS
XYZ 880742.3714 -5551914.7697 3003373.1811 NEW L1 PHS CEN @ 2020.5397
XYZ 880742.3632 -5551914.7210 3003373.1549 NEW ARP @ 2020.5397
XYZ 880742.1442 -5551913.3372 3003372.4010 NEW MON @ 2020.5397
LLH 28 16 29.93675 279 0 50.93579   -9.7481 NEW L1 PHS CEN @ 2020.5397
LLH 28 16 29.93676 279 0 50.93577   -9.8039 NEW ARP @ 2020.5397
LLH 28 16 29.93675 279 0 50.93579 -11.3950 NEW MON @ 2020.5397

BASELINE NAME: okcb 1397
XYZ 0.0285 0.1680 -0.0288 + XYZ ADJUSTMENTS
XYZ 880742.3744 -5551914.7691 3003373.1761 NEW L1 PHS CEN @ 2020.5397
XYZ 880742.3662 -5551914.7205 3003373.1499 NEW ARP @ 2020.5397
XYZ 880742.1472 -5551913.3366 3003372.3959 NEW MON @ 2020.5397
LLH 28 16 29.93661 279 0 50.93590   -9.7505 NEW L1 PHS CEN @ 2020.5397
LLH 28 16 29.93662 279 0 50.93588   -9.8064 NEW ARP @ 2020.5397
LLH 28 16 29.93661 279 0 50.93590 -11.3974 NEW MON @ 2020.5397

G-FILES

Axx2020 716 20 716
B2020 7161027 20 71616 0 1 page5 v1801.18IGS 132 1 2 27NGS 2020 825IFDDPX
IITRF2014_2114 IGS 20200712
C00090001 -814068167 6 -521679362 25 -745037915 13 X1980A1397X1980AWACH
D 1 2 -3139805 1 3 4706798 2 3 -8974151

Axx2020 716 20 716
B2020 7161027 20 71616 0 1 page5 v1801.18IGS 132 1 2 27NGS 2020 825IFDDPX
IITRF2014_2114 IGS 20200712
C00090002 -331933222 6 368529241 26 759908291 15 X1980A1397X1980ADLND

D 1 2 -6119815 1 3 4429497 2 3 -8810475

Axx2020 716 20 716
B2020 7161027 20 71616 0 1 page5 v1801.18IGS   132 1 2 27NGS   2020 825IFDDPX
IITRF2014_2114   IGS   20200712
C00090005 209232700   6 -494073771   26 -989294812   15 X1980A1397X1980AOKCB
D 1 2 -6183762 1 3 4908746 2 3 -8671621

POST-FIT RMS BY SATELLITE VS. BASELINE

        OVERALL   01   02   03   04   06   07   08   09
wach-1397| 0.016 0.014 0.041 0.037 0.013 0.027 0.015 0.011 0.011
           11   13   16   17   19   21   22   24   27
wach-1397| 0.009 0.014 0.023 0.019 0.017   ... 0.021   ... 0.018
           28   30
wach-1397| 0.012 0.013

        OVERALL   01   02   03   04   06   07   08   09
dlnd-1397| 0.020 0.016 0.051 0.032 0.014 0.032 0.010 0.026 0.010
           11   13   16   17   19   21   22   24   27
dlnd-1397| 0.012 0.014 0.025 0.023 0.027   ... 0.033 0.053 0.016
           28   30
dlnd-1397| 0.015 0.013

        OVERALL   01   02   03   04   06   07   08   09
okcb-1397| 0.020 0.019 0.036 0.022 0.013 0.030 0.012 0.044 0.013
           11   13   16   17   19   21   22   24   27
okcb-1397| 0.019 0.012 0.024 0.020 0.022   ... 0.036 0.091 0.016
           28   30
okcb-1397| 0.020 0.014

OBS BY SATELLITE VS. BASELINE

        OVERALL   01   02   03   04   06   07   08   09
wach-1397| 4208   498   108   90   131   248   48   278   245
           11   13   16   17   19   21   22   24   27
wach-1397| 414   53   70   489   360   ...   61   ...   111
           28   30
wach-1397| 379   625
        OVERALL   01   02   03   04   06   07   08   09
dlnd-1397| 4742   542   90   268   141   260   517   75   241
           11   13   16   17   19   21   22   24   27
dlnd-1397| 438   45   70   491   380   ...   233   39   142
           28   30
dlnd-1397| 164   606
        OVERALL   01   02   03   04   06   07   08   09
okcb-1397| 4711   538   100   273   141   264   517   70   241
           11   13   16   17   19   21   22   24   27
okcb-1397| 438   74   70   491   372   ...   197   18   130
           28   30
okcb-1397| 156   621

 ITRF position of 1397 as determined by individual baselines
           X   Y   Z
wach   880742.144   -5551913.344   3003372.399
dlnd   880742.144   -5551913.337   3003372.401

okcb 880742.147 -5551913.337 3003372.396

Residuals of position determined by individual baselines from the final position

	X	Y	Z	East	North	Up
wach	-0.001	-0.004	0.000	-0.002	-0.002	0.004
dlnd	-0.001	0.002	0.003	-0.001	0.003	-0.001
okcb	0.002	0.003	-0.003	0.002	-0.001	-0.003

Covariance Matrix for the xyz OPUS Position (meters^2).

0.0000002400	-0.0000000586	0.0000000299
-0.0000000586	0.0000050267	-0.0000002498
0.0000000299	-0.0000002498	0.0000015956

Covariance Matrix for the enu OPUS Position (meters^2).

0.0000003394	0.0000003143	-0.0000006087
0.0000003143	0.0000021265	-0.0000012451
-0.0000006087	-0.0000012451	0.0000043964

Horizontal network accuracy = 0.00295 meters.
Vertical network accuracy = 0.00411 meters.

Derivation of NAD 83 vector components

Position of reference station ARP in NAD_83(2011)(EPOCH:2010.0000).

	Xa(m)	Ya(m)	Za(m)	
WACH	799336.16445	-5604082.87126	2928868.78053	2010.00
DLND	847549.66841	-5515061.98181	3079363.38792	2010.00
OKCB	901666.25422	-5601322.30851	2904443.08260	2010.00

Position of reference station monument in NAD_83(2011)(EPOCH:2010.0000).

	Xr(m)	Yr(m)	Zr(m)	
WACH	799336.16445	-5604082.87126	2928868.78053	2010.00
DLND	847549.66841	-5515061.98181	3079363.38792	2010.00
OKCB	901666.25422	-5601322.30851	2904443.08260	2010.00

Velocity of reference station monument in NAD_83(2011)(EPOCH:2010.0000).

	Vx (m/yr)	Vy (m/yr)	Vz (m/yr)
WACH	0.00128	0.00265	-0.00157
DLND	0.00141	0.00220	-0.00149
OKCB	0.00118	0.00217	-0.00155

Vectors from unknown station monument to reference station monument
in NAD_83(2011)(EPOCH:2010.0000).

	Xr-X= DX(m)	Yr-Y= DY(m)	Zr-Z= DZ(m)	
WACH	-81406.82455	-52167.97026	-74503.77347	2010.00
DLND	-33193.32059	36852.91919	75990.83392	2010.00
OKCB	20923.26522	-49407.40751	-98929.47140	2010.00

STATE PLANE COORDINATES - U.S. Survey Foot
SPC (0901 FL E)

Northing (Y) [feet]	1432676.360
Easting (X) [feet]	660722.645
Convergence [degrees]	0.00670556
Point Scale	0.99994120
Combined Factor	0.99994275

********** New Reference Frame Preview **********

We are replacing the nation's NAD 83 and NAVD 88 datums, to improve access and accuracy of the National Spatial Reference System. More at https://geodesy.noaa.gov/datums/newdatums/

Below are approximate coordinates for this solution in the new frames:

APPROX ORTHO HGT: 18.334 (m) [PROTOTYPE (Computed using xGeoid19B,GRS80,ITRF2014)]

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

JOB TITLE:	SFWMD PH 4 WELLS-OSF-92	OBSERVER:	LAPOLLA	MISCLOSURE:	0.003		
JOB NO.:	20-1017-02-01	ROD 1:	GORMAN	CUMMALITIVE DIST.:	335.1		
RUN DATE:	7/14/2020	NOTES:		ERROR PER FOOT:	8.95255E-06		
FIELDBOOK:	1869						
PAGES:	17-18	START ELEV:	61.411	BM NAME:	CR 532 G	MTS ALLOWABLE ERROR:	0.005
DATUM:	NAVD 88	END ELEV:	61.411	BM NAME:	CR 532 G		

STA. NO.	BS TOP	BS MID	BS BOT	BS AVG	BS DIST	HI	FS TOP	FS MID	FS BOT	FS AVG	FS DIST	REDUCED ELEV	TURN DIST	ADJ ELEV	DESCRIPTION
0												61.411	0.0	61.411	CR 532 G
1	8.475	8.110	7.743	8.109	73.200	69.520	9.659	9.360	9.061	9.360	59.800	60.160	133.0	60.162	OSF - 92
2	9.461	9.164	8.868	9.164	59.300	69.325	10.210	10.039	9.865	10.038	34.500	59.287	226.8	59.289	MEAS POINT ON WELL
3	10.028	9.850	9.680	9.853	34.800	69.139	8.100	7.730	7.365	7.732	73.500	61.408	335.1	61.411	CR 532 G

Office

Project

30 August 2020

INPUT	OUTPUT
Geographic, flhpgn - Florida HPGN	Geographic, flhpgn - Florida HPGN
Vertical - NAVD88, U.S. Feet	Vertical - NGVD29 (Custom), U.S. Feet

OSC-92

1/1

Latitude:	28 16 29.91533	**Latitude:**	28 16 29.91533
Longitude:	80 59 09.04258	**Longitude:**	80 59 09.04258
Elevation/Z:	0	**Elevation/Z:**	1.198

Remark:

Shared Solution

PID: BBGY02
Designation: OSF 92 LB 4108
Stamping: OSF-92 LB 4108 2020
Stability: Monuments of questionable or unknown reliability
Setting: Set into or on top of metal pipe driven into ground
Description: FROM THE INTERSECTION OF SR 520 AND CR 532, GO SOUTHERLY AND THEN WEST ON CR 532 FOR 11.2 MILES TO THE MARK ON THE RIGHT. MARK IS 14 FT SOUTH OF A R/W FENCE, 79 FT WNW OF THE WEST END OF A CONCRETE HEAD WALL AT A DRAINAGE DITCH CROSSING UNDER CR 532, AND 45 FT NORTH OF THE NORTH EDGE OF PAVEMENT OF CR 532.
Observed: 2020-07-16T10:27:00Z
Source: OPUS - page5 1801.18

Close-up View

REF_FRAME: NAD_83(2011)	EPOCH: 2010.0000	SOURCE: NAVD88 (Computed using GEOID18)	UNITS: m	SET PROFILE	DETAILS

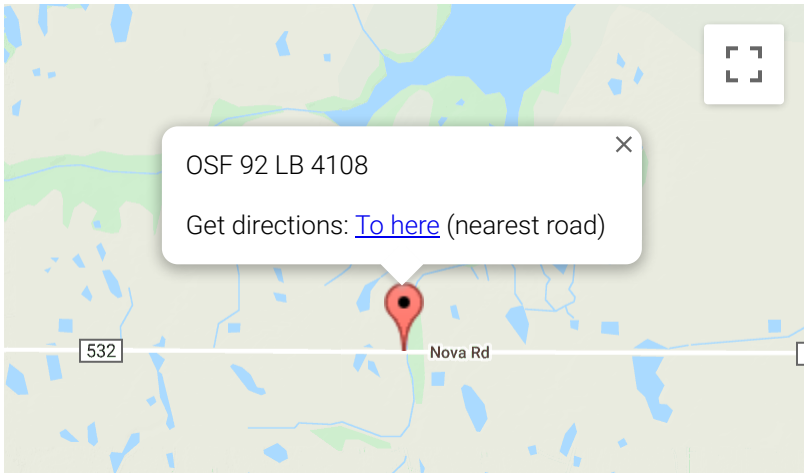
LAT:	28° 16' 29.91533" ± 0.005 m	
LON:	-80° 59' 9.04258" ± 0.004 m	
ELL HT:	-9.846 ± 0.007 m	
X:	880742.989 ± 0.003 m	
Y:	-5551914.901 ± 0.007 m	
Z:	3003372.554 ± 0.005 m	
ORTHO HT:	18.322 ± 0.051 m	

	UTM 17	**SPC** 901(FL E)
NORTHING:	3127663.616m	436680.628m
EASTING:	501388.191m	201388.665m
CONVERGENCE:	0.00670556°	0.00670556°
POINT SCALE:	0.99960002	0.99994120
COMBINED FACTOR:	0.99960157	0.99994275

CONTRIBUTED BY

petea
GCY Incorporated

Horizon View



The numerical values for this position solution have satisfied the quality control criteria of the National Geodetic Survey. The contributor has verified that the information submitted is accurate and complete.