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## **SURVEYOR'S REPORT**

### **USGS Wells Phase 4**

USGS Station No: 272504081120101

Station Name: H-11A

Prepared For: South Florida Water Management  
District

Work Order No: 4600004161-WO5

Report Date: September 1, 2020



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## SURVEYOR'S REPORT

According to the:  
**STATE OF FLORIDA**  
**Standards of Practice**  
**CHAPTER 472.027 Florida Statutes**  
**Chapter 5J-17.050 through 5J-17.052, Florida Administrative Code**

This report and copies thereof are not valid without the signature and original raised seal of a Florida Licensed Surveyor and Mapper. **This report is not valid without the digital files referenced in this report.**

Additions or deletions to the report by other than the signing party are prohibited without written consent of the signing party.

All field work was performed by:

T2 UES, Inc., LB00008336  
5670 Zip Drive  
Fort Myers, Florida 33905  
Phone: (239) 277-0722 Fax: (239) 277-7179  
Scott Urquhart, PSM 6524 (Surveyor and Mapper in Responsible Charge)

I hereby certify that as a duly registered Florida Professional Surveyor and Mapper, I have prepared this Report for the specific purpose of providing the **South Florida Water Management District** with the information as outlined. This report is not complete without the referenced information being available during an examination of said Report. I further certify that the precision achieved and the care taken in collecting the data to formulate this Report are adequate for the purpose of the assignment and that the standards set forth in Chapter 5J-17.050 through 5J-17.052 of the Florida Administrative Code have been met.

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Scott Urquhart  
Professional Surveyor & Mapper  
Florida Certificate No. 6524  
(For the firm – LB 8336)

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Date Signed

## PURPOSE OF SURVEY AND PROJECT OVERVIEW

The specific purpose of this survey is establish North American Vertical Datum of 1988 (NAVD88) elevations for United States Geological Survey (USGS) well site **H-11A**, provide a site benchmark and additional well data as follows:

- Establish an elevation on the USGS measuring mark on top of the well(s) at each site.
- Stamp a District provided aluminum tag with the appropriate data in the appropriate spaces on the tag. Including the Corpscon 6.0.1 vertical offset value from NGVD1929 to NAVD1988.
- Establish a North American Datum 83/11 (or higher) State Plane Coordinate on the benchmark and the well head.
- Provide an NAVD88 elevation on each of the USGS benchmarks (in the USGS Reports noted as “Reference Marks” or “RM’s”) recovered at the site.
- Take a typical ground shot near the well.
- Take an elevation shot on all four (4) corners of the concrete well pad.
- Measure the well diameter to determine the casing material (i.e. PVC), include a picture with a ruler on it and state and show in the report.
- Determine distance to the water table inside the well (DTW) (measurement from the well measuring point, along with time and date). Measure the well head size whether it is a manhole or surface casing.
- Complete the standard District benchmark form for each control monument set and submit the form as a .pdf and a .xlsx.

## SITE LOCATION

See Page 6 for SFWMD Well Site Form.

## PROJECT DATUM

- Horizontal – The project horizontal data is referenced to the North American Datum of 1983, 2011 adjustment, Florida State Plane Coordinate System, East Zone, U.S. Survey Feet.
- Vertical – The project vertical data is referenced to the North American Vertical Datum of 1988 (NAVD88). All data referenced to National Geodetic Vertical Datum of 1929 (NGVD29) was converted utilizing **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.





## **LEVELING PROCEDURES AND METHODOLOGY**

All control leveling for the project was completed utilizing a Leica DNA 03 (serial number 347859) and Leica LS10 digital level (serial number 700874) with barcode level rod. Collimation and adjustment of the instrument was completed prior to leveling. Leveling began on National Geodetic Survey Benchmark B 463, ran through site benchmark H 11A and closed on National Geodetic Survey Benchmark C 463. All leveling was completed in accordance with standard survey practice utilizing conventional third order methods, techniques, and equipment. The overall closure met or exceeded allowable project requirements of  $0.02 \times \text{SQRT}(\text{miles})$ .

See page 25 for SFWMD Benchmark Datasheet.

## **NATIONAL GEODETIC SURVEY ONLINE POSITIONING USER SERVICE (OPUS)**

The site-established benchmark was also occupied collecting positional GPS data for a duration of 6.5 hours. This information was then uploaded to the OPUS site for processing. See pages 26-29 for H-11A OPUS Report.

## **DATES OF FIELD DATA COLLECTION**

Field survey work by T2 was performed between July 28th & August 26th, 2020. Field notes are contained in Field Book 555, pages 16-17, 43, 72-73; Field Book 537, page 72; Field Book 486, page 68.



# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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U.S.G.S. Station Name: H-11A	U.S.G.S. Station Number: 272504081120101	Agency: T2 UES, Inc.	Date of Field Work: 8-26-20
Party Chief: <b>DOULE</b>	Field Book: 555; 537; 486	Page(s): 16-17, 43, 72-73; 72; 68	Report Prepared by: <b>CHAMBLESS</b>

### SITE SPECIFIC DATA

Site Benchmark: H-11A	Benchmark Elevation(s) (NAVD88): 47.84	Corpscon 6.0.1 Conversion Factor (NAVD88 to NGVD29) +1.15	
Well Reference Elevation (NAVD88): 49.83	DTW: 3.00 (08/24/20 at : 8:57PM)	Ground Elevation (NAVD88): 47.60	Pad Elevation (NAVD88): N/A

### GEOGRAPHIC DATA

Section 23	Township 35S	Range 31E
Well Latitude: 27°25'05.95" N	Well Longitude: 81°12'01.35" W	Location Source: RTK GPS
State Plane Coordinates:	Northing (Y) = 1121289.8670'	Easting (X) = 591164.06

**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: "H-11A"  
Reference Point: TOP OF 11"  
IRON FLANGE

Reference Point El. = 49.83  
feet NAVD88

Distance to Water = 3.00  
feet from reference point  
(08/24/20 at 8:57 PM)



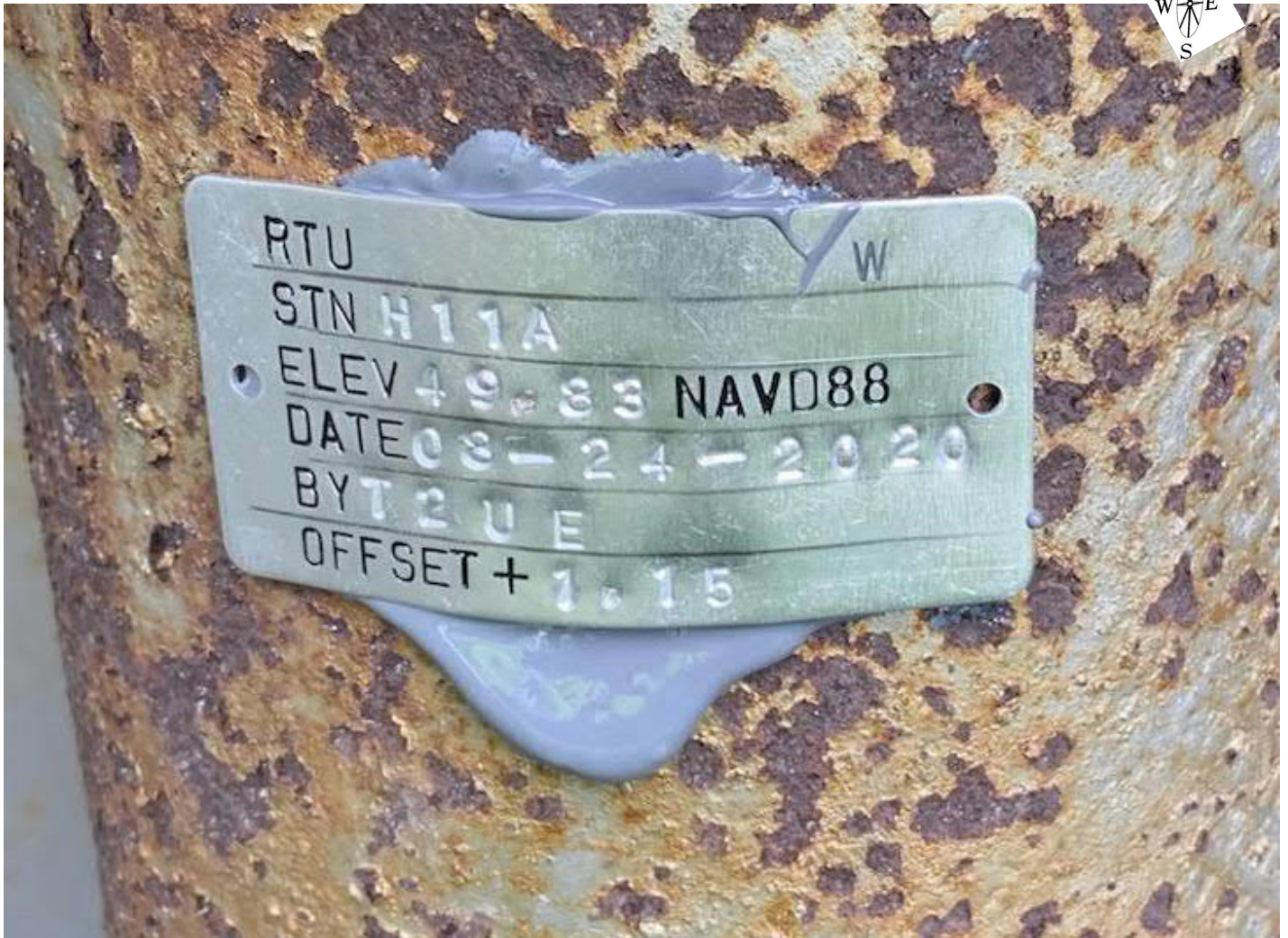




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New Aluminum Tag





# **SOUTH FLORIDA WATER MANAGEMENT DISTRICT**

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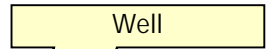
USGS RMs

NO REPORT PROVIDED



Site Benchmark

Site Benchmark Overall Photo



Site BM:



Latitude: 27°25'05.89" N  
Longitude: 81°12'01.20" W  
NAVD88 EL = 47.84







Source Benchmarks



NGS Benchmark "B463" (AH8821)



Latitude: 27°25'30.98840" N  
Longitude: 81°12'51.30328" W  
NAVD88 EL = 52.52



NGS Benchmark "C463" (AH8821)



Latitude: 27°25'18.11147" N  
Longitude: 81°12'25.57326" W  
NAVD88 EL = 48.99



"B463" Benchmark Datasheet (1 of 3)

DATASHEETS

Page 1 of 3

The NGS Data Sheet

See file [dsdata.pdf](#) for more information about the datasheet.

```

PROGRAM = datasheet95, VERSION = 8.12.5.7
Starting Datasheet Retrieval...
1 National Geodetic Survey, Retrieval Date = MAY 19, 2020
AH8821 *****
AH8821 DESIGNATION - B 463
AH8821 PID - AH8821
AH8821 STATE/COUNTY- FL/HIGHLANDS
AH8821 COUNTRY - US
AH8821 USGS QUAD - BASINGER NW (2018)
AH8821
AH8821 *CURRENT SURVEY CONTROL
AH8821
AH8821* NAD 83(2011) POSITION- 27 25 30.98840(N) 081 12 51.30328(W) ADJUSTED
AH8821* NAD 83(2011) ELLIP HT- -10.005 (meters) (06/27/12) ADJUSTED
AH8821* NAD 83(2011) EPOCH - 2010.00
AH8821* NAVD 88 ORTHO HEIGHT - 16.009 (meters) 52.52 (feet) ADJUSTED
AH8821
AH8821 GEOID HEIGHT - -26.023 (meters) GEOID18
AH8821 NAD 83(2011) X - 865,322.430 (meters) COMP
AH8821 NAD 83(2011) Y - -5,598,853.563 (meters) COMP
AH8821 NAD 83(2011) Z - 2,920,118.395 (meters) COMP
AH8821 LAPLACE CORR - -1.34 (seconds) DEFLEC18
AH8821 DYNAMIC HEIGHT - 15.985 (meters) 52.44 (feet) COMP
AH8821 MODELED GRAVITY - 979,126.8 (mgal) NAVD 88
AH8821
AH8821 VERT ORDER - SECOND CLASS I
AH8821
AH8821 Network accuracy estimates per FGDC Geospatial Positioning Accuracy
AH8821 Standards:
AH8821 FGDC (95% conf, cm) Standard deviation (cm) CorrNE
AH8821 Horiz Ellip SD_N SD_E SD_h (unitless)
AH8821 -----
AH8821 NETWORK 0.94 1.49 0.39 0.38 0.76 0.01012680
AH8821 -----
AH8821 Click here for local accuracies and other accuracy information.
AH8821
AH8821
AH8821.The horizontal coordinates were established by GPS observations
AH8821.and adjusted by the National Geodetic Survey in June 2012.
AH8821
AH8821.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has
AH8821.been affixed to the stable North American tectonic plate. See
AH8821.NA2011 for more information.
AH8821
AH8821.The horizontal coordinates are valid at the epoch date displayed above
AH8821.which is a decimal equivalence of Year/Month/Day.
AH8821
AH8821.The orthometric height was determined by differential leveling and
AH8821.adjusted by the NATIONAL GEODETTIC SURVEY
AH8821.in July 1999.
AH8821
AH8821

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## "B463" Benchmark Datasheet (2 of 3)

DATASHEETS

Page 2 of 3

AH8821.Significant digits in the geoid height do not necessarily reflect accuracy.  
AH8821.GEOID18 height accuracy estimate available [here](#).

AH8821

AH8821.Click [photographs](#) - Photos may exist for this station.

AH8821

AH8821.The X, Y, and Z were computed from the position and the ellipsoidal ht.

AH8821

AH8821.The Laplace correction was computed from DEFLEC18 derived deflections.

AH8821

AH8821.The ellipsoidal height was determined by GPS observations

AH8821.and is referenced to NAD 83.

AH8821

AH8821.The dynamic height is computed by dividing the NAVD 88

AH8821.geopotential number by the normal gravity value computed on the

AH8821.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45

AH8821.degrees latitude (g = 980.6199 gals.).

AH8821

AH8821.The modeled gravity was interpolated from observed gravity values.

AH8821

AH8821. The following values were computed from the NAD 83(2011) position.

AH8821

AH8821;		North	East	Units	Scale Factor	Converg.
AH8821;SPC FL E	-	342,542.868	178,816.348	MT	0.99994671	-0 05 55.3
AH8821;SPC FL E	-	1,123,826.06	586,666.64	sFT	0.99994671	-0 05 55.3
AH8821;UTM 17	-	3,033,557.975	478,823.575	MT	0.99960554	-0 05 55.3

AH8821

AH8821! - Elev Factor x Scale Factor = Combined Factor

AH8821!SPC FL E - 1.00000157 x 0.99994671 = 0.99994828

AH8821!UTM 17 - 1.00000157 x 0.99960554 = 0.99960711

AH8821

AH8821 U.S. NATIONAL GRID SPATIAL ADDRESS: 17RML7882333557(NAD 83)

AH8821

### SUPERSEDED SURVEY CONTROL

AH8821

AH8821 NAD 83(2007)- 27 25 30.98866(N) 081 12 51.30435(W) AD(2002.00) 0

AH8821 ELLIP H (02/10/07) -10.007 (m) GP(2002.00)

AH8821 NAD 83(1999)- 27 25 30.98854(N) 081 12 51.30429(W) AD( ) 1

AH8821 ELLIP H (05/31/01) -9.989 (m) GP( ) 4 1

AH8821 NAD 83(1990)- 27 25 30.98740(N) 081 12 51.30392(W) AD( ) 1

AH8821 ELLIP H (06/01/99) -10.016 (m) GP( ) 4 1

AH8821 NAVD 88 16.05 (m) 52.7 (f) LEVELING 3

AH8821

AH8821.Superseded values are not recommended for survey control.

AH8821

AH8821.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.

AH8821.See file [dsdata.pdf](#) to determine how the superseded data were derived.

AH8821

AH8821\_MARKER: DD = SURVEY DISK

AH8821\_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT

AH8821\_STAMPING: B 463 1997

AH8821\_MARK LOGO: FLDEP

AH8821\_MAGNETIC: N = NO MAGNETIC MATERIAL

AH8821\_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO

AH8821+STABILITY: SURFACE MOTION

AH8821\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR

AH8821+SATELLITE: SATELLITE OBSERVATIONS - December 15, 2014

AH8821

AH8821 HISTORY - Date Condition Report By

AH8821 HISTORY - 1997 MONUMENTED FLDEP

AH8821 HISTORY - 20050119 GOOD INDIV



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## "B463" Benchmark Datasheet (3 of 3)

DATASHEETS

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AH8821	HISTORY	- 20050628	GOOD	MACTEC
AH8821	HISTORY	- 20091118	GOOD	PICKET
AH8821	HISTORY	- 20141215	GOOD	SFLWMD

AH8821  
 AH8821 STATION DESCRIPTION

AH8821'DESCRIBED BY FL DEPT OF ENV PRO 1997 (JLM)  
 AH8821'THE MARK IS ABOUT 30.2 MI (48.6 KM) NORTHWEST OF OKEECHOBEE, 4.8 MI  
 AH8821'(7.7 KM) WEST OF THE KISSIMMEE RIVER, 2.8 MI (4.5 KM) SOUTHEAST OF  
 AH8821'LORIDA IN SECTION 22, TOWNSHIP 35 SOUTH, RANGE 31 EAST. TO REACH THE  
 AH8821'MARK FROM THE POST OFFICE IN LORIDA, GO SOUTHEAST ON U.S. HIGHWAY 98  
 AH8821'FOR 2.8 MI (4.5 KM) TO THE MARK ON THE LEFT, SET IN THE TOP OF A ROUND  
 AH8821'CONCRETE MONUMENT FLUSH WITH THE GROUND AND 0.5 FT (15.2 CM) BELOW THE  
 AH8821'LEVEL OF U.S. HIGHWAY 98. LOCATED 58.0 FT (17.7 M) SOUTHEAST OF THE  
 AH8821'APPROXIMATE CENTERLINE OF A DIRT ROAD LEADING NORTHEAST, 52.8 FT (16.1  
 AH8821'M) NORTHEAST OF THE CENTERLINE OF U.S. HIGHWAY 98, 1.5 FT (0.5 M)  
 AH8821'SOUTHWEST OF A BARBWARE FENCE AND 1.4 FT (0.4 M) SOUTHWEST OF A  
 AH8821'CARSONITE WITNESS POST.

AH8821  
 AH8821 STATION RECOVERY (2005)

AH8821'RECOVERY NOTE BY INDIVIDUAL CONTRIBUTORS 2005  
 AH8821'RECOVERED AS DESCRIBED. RECOVERY NOTE BY COONER AND ASSOCIATES, INC.

AH8821  
 AH8821 STATION RECOVERY (2005)

AH8821'RECOVERY NOTE BY MACTEC ENGINEERING AND CONSULTING 2005 (CGB)  
 AH8821'RECOVERED AS DESCRIBED

AH8821  
 AH8821 STATION RECOVERY (2009)

AH8821'RECOVERY NOTE BY PICKETT AND ASSOCIATES 2009 (JM)  
 AH8821'RECOVERED IN GOOD CONDITION.

AH8821  
 AH8821 STATION RECOVERY (2014)

AH8821'RECOVERY NOTE BY S FL WATER MGMT DIST 2014  
 AH8821'RECOVERED IN GOOD CONDITION.

\*\*\* retrieval complete.  
 Elapsed Time = 00:00:03



"C463" Benchmark Datasheet (1 of 3)

DATASHEETS

Page 1 of 3

The NGS Data Sheet

See file [dsdata.pdf](#) for more information about the datasheet.

PROGRAM = datasheet95, VERSION = 8.12.5.7  
Starting Datasheet Retrieval...  
1 National Geodetic Survey, Retrieval Date = MAY 19, 2020  
AH8822 \*\*\*\*\*  
AH8822 DESIGNATION - C 463  
AH8822 PID - AH8822  
AH8822 STATE/COUNTY- FL/HIGHLANDS  
AH8822 COUNTRY - US  
AH8822 USGS QUAD - BASINGER NW (2018)  
AH8822  
AH8822 \*CURRENT SURVEY CONTROL  
AH8822  
AH8822\* NAD 83(2011) POSITION- 27 25 18.11147(N) 081 12 25.57326(W) ADJUSTED  
AH8822\* NAD 83(2011) ELLIP HT- -11.084 (meters) (06/27/12) ADJUSTED  
AH8822\* NAD 83(2011) EPOCH - 2010.00  
AH8822\* [NAVD 88](#) ORTHO HEIGHT - 14.932 (meters) 48.99 (feet) ADJUSTED  
AH8822  
AH8822 GEOID HEIGHT - -26.026 (meters) GEOID18  
AH8822 NAD 83(2011) X - 866,048.597 (meters) COMP  
AH8822 NAD 83(2011) Y - -5,598,925.034 (meters) COMP  
AH8822 NAD 83(2011) Z - 2,919,766.079 (meters) COMP  
AH8822 LAPLACE CORR - -1.38 (seconds) DEFLEC18  
AH8822 DYNAMIC HEIGHT - 14.909 (meters) 48.91 (feet) COMP  
AH8822 MODELED GRAVITY - 979,126.6 (mgal) NAVD 88  
AH8822  
AH8822 VERT ORDER - SECOND CLASS I  
AH8822  
AH8822 Network accuracy estimates per FGDC Geospatial Positioning Accuracy  
AH8822 Standards:  
AH8822 FGDC (95% conf, cm) Standard deviation (cm) CorrNE  
AH8822 Horiz Ellip SD\_N SD\_E SD\_h (unitless)  
AH8822 -----  
AH8822 NETWORK 1.05 1.61 0.44 0.42 0.82 0.03149503  
AH8822 -----  
AH8822 Click [here](#) for local accuracies and other accuracy information.  
AH8822  
AH8822  
AH8822.The horizontal coordinates were established by GPS observations  
AH8822.and adjusted by the National Geodetic Survey in June 2012.  
AH8822  
AH8822.NAD 83(2011) refers to NAD 83 coordinates where the reference frame has  
AH8822.been affixed to the stable North American tectonic plate. See  
AH8822.[NA2011](#) for more information.  
AH8822  
AH8822.The horizontal coordinates are valid at the epoch date displayed above  
AH8822.which is a decimal equivalence of Year/Month/Day.  
AH8822  
AH8822.The orthometric height was determined by differential leveling and  
AH8822.adjusted by the NATIONAL GEODETIC SURVEY  
AH8822.in July 1999.  
AH8822





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## "C463" Benchmark Datasheet (2 of 3)

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AH8822.Significant digits in the geoid height do not necessarily reflect accuracy.  
 AH8822.GEOID18 height accuracy estimate available [here](#).  
 AH8822  
 AH8822.Click [photographs](#) - Photos may exist for this station.  
 AH8822  
 AH8822.The X, Y, and Z were computed from the position and the ellipsoidal ht.  
 AH8822  
 AH8822.The Laplace correction was computed from DEFLEC18 derived deflections.  
 AH8822  
 AH8822.The ellipsoidal height was determined by GPS observations  
 AH8822.and is referenced to NAD 83.  
 AH8822  
 AH8822.The dynamic height is computed by dividing the NAVD 88  
 AH8822.geopotential number by the normal gravity value computed on the  
 AH8822.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45  
 AH8822.degrees latitude (g = 980.6199 gals.).  
 AH8822  
 AH8822.The modeled gravity was interpolated from observed gravity values.  
 AH8822  
 AH8822. The following values were computed from the NAD 83(2011) position.  
 AH8822  

AH8822;		North	East	Units	Scale Factor	Converg.
AH8822;SPC FL E	-	342,145.333	179,522.358	MT	0.99994635	-0 05 43.4
AH8822;SPC FL E	-	1,122,521.81	588,982.94	sFT	0.99994635	-0 05 43.4
AH8822;UTM 17	-	3,033,160.576	479,529.345	MT	0.99960517	-0 05 43.4

AH8822!		Elev Factor	x	Scale Factor	=	Combined Factor
AH8822!SPC FL E	-	1.00000174	x	0.99994635	=	0.99994809
AH8822!UTM 17	-	1.00000174	x	0.99960517	=	0.99960691

  
 AH8822  
 AH8822\_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RML7952933160(NAD 83)  
 AH8822  
 AH8822  
 AH8822 SUPERSEDED SURVEY CONTROL  
 AH8822  

AH8822	NAD 83(2007)-	27 25 18.11177(N)	081 12 25.57436(W)	AD(2002.00)	0
AH8822	ELLIP H (02/10/07)	-11.084 (m)		GP(2002.00)	
AH8822	NAD 83(1999)-	27 25 18.11160(N)	081 12 25.57424(W)	AD( )	1
AH8822	ELLIP H (05/31/01)	-11.064 (m)		GP( )	4 1
AH8822	NAD 83(1990)-	27 25 18.11048(N)	081 12 25.57393(W)	AD( )	1
AH8822	ELLIP H (06/01/99)	-11.087 (m)		GP( )	4 1
AH8822	NAVD 88	14.97 (m)	49.1 (f)	LEVELING	3

  
 AH8822  
 AH8822.Superseded values are not recommended for survey control.  
 AH8822  
 AH8822.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.  
 AH8822.See file [dsdata.pdf](#) to determine how the superseded data were derived.  
 AH8822  
 AH8822\_MARKER: F = FLANGE-ENCASED ROD  
 AH8822\_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.)  
 AH8822\_STAMPING: C 463 1997  
 AH8822\_MARK LOGO: NGS  
 AH8822\_PROJECTION: FLUSH  
 AH8822\_MAGNETIC: N = NO MAGNETIC MATERIAL  
 AH8822\_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL  
 AH8822\_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR  
 AH8822+SATELLITE: SATELLITE OBSERVATIONS - May 27, 2010  
 AH8822\_ROD/PIPE-DEPTH: 19.0 meters  
 AH8822  

AH8822	HISTORY	- Date	Condition	Report By
AH8822	HISTORY	- 1997	MONUMENTED	FLDEP





# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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## Field Notes (1 of 7)

171204.05 SFWMD USGS WELLS PH4  
LEVEL RUN H11-A

### COLLIMATION

COLL. ERR. OLD 7.8    COLL. ERR. NEW 5.4  
DIFF - 2.5    RETICLE 5.30656

STA	BS	HI	FS	ELV
B463	5.233	57.753		
			5.343	52.409
1	4.920	57.330		
			5.153	52.176
2	4.459	56.636		
			5.472	51.163
3	4.652	55.816		
			6.814	49.002
4	6.127	55.130		
			5.174	49.955
5	5.171	55.127		
			4.940	50.186
6	4.724	54.911		
			4.993	49.918

E DOYLE    7/28/20  
B REIDER

FB 555 P 616  
PAGE 10 FZ

INST: LEICA LS20 S/N 700784  
FILE: 171204.05 ED 72820

\* COULD NOT ELEVATE WELL LOCKED! KEY DOES NOT WORK!

DESC

B463 (VGS PT) PID A48821 EL=52.52

TP1 TEMP TURN

TP2 TEMP TURN

TP3 TEMP TURN

C463 (VGS PT) PID A48822 EL=48.99

TP4 TEMP TURN

TP5 TEMP TURN

TP6 TEMP TURN





# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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## Field Notes (2 of 7)

STA	BS	HI	FS	ELV	DESC
17120405					USGS Wells
BENCHRUN CONT.,,					
7	5.221	55.140	7.286	47.853	
8	7.379	55.233	5.314	49.918	
9	4.991	54.910	4.716	50.193	
10	4.886	55.079	5.113	49.966	
11	4.946	54.912	5.899	49.012	

DATE	TIME	LOCATION	REMARKS
7/28/20			FB 555 PG 17
			PAGE 2002
			DESC
			CONC MON H11-A
			CONC MON H11-A
			TP7 TEMP TURN
			TP8 TEMP TURN
			TP9 TEMP TURN
			0463 NGS CHK IN EL = 48.99



# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 1/19

## Field Notes (3 of 7)

<p>171204.05 SFWMD USGS WELLS PH4          WELL H11-A, OSF 11          ELEVATED TOP OF WELL</p> <p>COLLIMATION          COLL ERR OLD 2.0 COLL ERR NEW 4.8          DIFF 2.8 RETICLE 4.39431          H11-A</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>STA</th> <th>BS</th> <th>HI</th> <th>FS</th> <th>ELV</th> </tr> </thead> <tbody> <tr> <td>H11A</td> <td>4.943</td> <td>52.796</td> <td></td> <td>47.853</td> </tr> <tr> <td></td> <td></td> <td></td> <td>2.951</td> <td>49.845</td> </tr> <tr> <td>1</td> <td>2.799</td> <td>52.644</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>4.792</td> <td>47.852</td> </tr> </tbody> </table> <p>OSF 11          LEVEL RUN FROM Y512 TO W512          COLLIMATION          COLL ERR OLD 4.8 COLL ERR NEW -3.2          DIFF -8.0 RETICLE 5.43926</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>STA</th> <th>BS</th> <th>HI</th> <th>FS</th> <th>ELV</th> </tr> </thead> <tbody> <tr> <td>Y512</td> <td>3.942</td> <td>81.042</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>5.683</td> <td>75.358</td> </tr> <tr> <td>1</td> <td>5.968</td> <td>81.267</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>5.248</td> <td>76.018</td> </tr> </tbody> </table>	STA	BS	HI	FS	ELV	H11A	4.943	52.796		47.853				2.951	49.845	1	2.799	52.644						4.792	47.852	STA	BS	HI	FS	ELV	Y512	3.942	81.042						5.683	75.358	1	5.968	81.267						5.248	76.018	<p>S DOUCE 8/10/20 FB 555 PG 43          B REIDER PAGE 10 F 3          J ABREV</p> <p>INST: LEICA LS10 S/N 700784          FILE: 171204.05 ED 81020</p> <p>DESC          H11-A CONC MON</p> <p>TOP OF WELL PIPE SW SIDE</p> <p>CHK IN TO B.M. H11-A</p> <p>INST: LEICA LS10 S/N 700784          FILE: 171204.05 ED 81020B</p> <p>DESC          Y512 NGS PT EL 77.10</p> <p>TP1 TEMP TURN</p> <p>TP2 TEMP TURN</p>
STA	BS	HI	FS	ELV																																															
H11A	4.943	52.796		47.853																																															
			2.951	49.845																																															
1	2.799	52.644																																																	
			4.792	47.852																																															
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# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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## Field Notes (4 of 7)

171204.05 SFWMD 11365 / PH. #4 WELLS

B. Retton

FB 558 PG 72

08-24-2020

WELL-H-11A

Bm H-11A EL 47.84

OPUS-H-11A

START ~~8:57 AM~~ 12.00

END 6.40

Pic # 12 WELL Bm 200' EAST  
WATER DEPTH FROM MEASURE POINT  
3'

GPS POSITION ON WELL H-11A  
N. 1121289.867 E 59164.060

OFFSET ON ELEV. ON WELL  
+1.152

- Pic # 1 Bm H-11A w/Close
- Pic # 2 Bm H-11A WAIST HIGH
- Pic # 3 Bm H-11A Looking NORTH
- Pic # 4 Bm H-11A Looking EAST
- Pic # 5 Bm H-11A Looking SOUTH
- Pic # 6 Bm H-11A Looking WEST
- Pic # 7 WELL H-11A WITH TAPE
- Pic # 8 WELL H-11A Looking NORTH
- Pic # 9 WELL H-11A Looking NORTH  
30' SOUTH
- Pic # 10 WELL H-11A Looking EAST
- Pic # 11 WELL H-11A Looking WEST  
NO Looking SOUTH LARGE BUSH  
RIGHT BEHIND WELL



# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 1/19

## Field Notes (5 of 7)

171204.05      SEWMA USGS/PA #4 WELLS      B. REFORM      FB 555 R. 73  
08-24-2020

N

BARBWIRES  
FENCE

WELL H-11A

8.3'

15.2'

Bm H-11A

DITCH

32.30 TO EOP

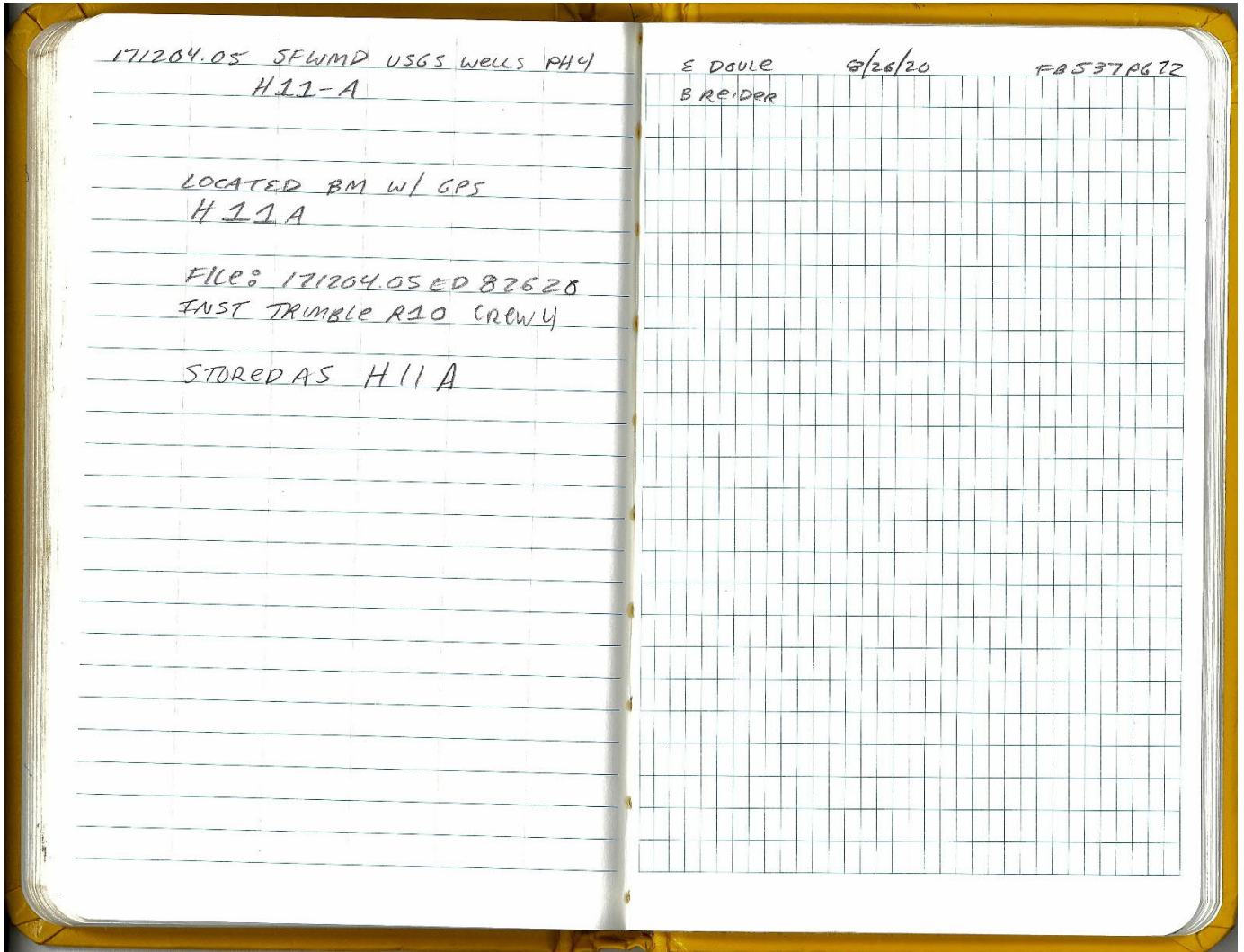
HIGHWAY 98



# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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## Field Notes (6 of 7)







# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 1/19

## Field Notes (7 of 7)

171204.05	SFWMD USGS PH4 WELLS (CONTINUED FROM PG 67)	J. CONNORS T. AOT	8/24/20	FB 486 PG 68
171204.05	M518 25' LOOKING NORTH.JPG	<u>SITE PICS</u>		
171204.05	M518.JPG	171204.05	CCR-W AREA.JPG	
171204.05	M518 WAIST HIGH.JPG	171204.05	CCR-W TAG.JPG	
171204.05	M518 25' LOOKING SOUTH.JPG	171204.05	CCR-W AREA.JPG	
171204.05	M518 25' LOOKING EAST.JPG	#50,010	Q506	
	<u>H-11A</u> * SHOTS FOR BARRY SEE FB 555 PG 72 * FOR LEVEL SET UP	<u>Q506 PICS</u>		
#50,004	GROUND = 47.70	171204.05	Q506.JPG	
#50,005	GROUND = 47.60	171204.05	Q506 WAIST HIGH.JPG	
#50,006	GROUND = 47.50	171204.05	Q506 25' LOOKING SOUTH.JPG	
#50,007	GROUND = 47.60	171204.05	Q506 25' LOOKING NORTH.JPG	
#50,008	SHOT @ H-11A	171204.05	Q506 25' LOOKING EAST.JPG	
	<u>CCR-W</u>	<u>SHOTS FOR ERTK</u>		
#50,009	N506	#145003	WELL	
	N506 PICS	#145004	LAG BOLT IN TREE	
171204.05	N506.JPG			
171204.05	N506 WAIST HIGH.JPG			
171204.05	N506 25' LOOKING SOUTH.JPG			
171204.05	N506 25' LOOKING NORTH.JPG			
171204.05	N506 25' LOOKING EAST.JPG			



### South Florida Water Management District Benchmark Datasheet

Designation: <b>H 11A</b>	Project Name: <b>USGS PHASE 4 WELLS</b>	Type: <b>V</b>	State Plane Zone: <b>FL East</b>
Stamping: <b>H 11A LB 8336 2020</b>	Field Book Name: <b>555</b>	Field Book Page: <b>16-17, 43, 72-73</b>	
Established By: <b>T2ues</b>	Recovered By: _____	Recovery Date: _____	
Surveyor: <b>REIDER</b>	Established Date: <b>08/24/20</b>	Status: <b>New</b>	

#### GEOGRAPHIC POSITION INFORMATION

Section: <b>23</b>	Township: <b>35S</b>	Range: <b>31E</b>
County: <b>HIGHLANDS</b>	Quadrangle: <b>BASINGER NW</b>	Quad Index: <b>2810</b>
NAD83 Adj. Year: <b>2011</b>	Vertical Datum: <b>NAVD1988</b>	Horizontal Datum: <b>NAD1983</b>
NAVD88 Elevation (feet): <b>47.838</b>	NGVD29 Elevation (feet): <b>48.988</b>	2022 Elevation: _____
NAVD88 Class: _____	NGVD29 Class: _____	Other Elevation: _____
NAVD88 Order: <b>3RD</b>	NGVD29 Order: _____	Other Elevation Type: _____
		NGS Source BM(s): <b>B 463, C463</b>
		NGS PID(s): <b>AH8821, AH8822</b>
		NGS NAVD88 Elev (ft): <b>52.52, 48.99</b>
		NGS NAVD88 Elev (m): <b>16.009, 14.932</b>
		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: + <b>1.15</b>	Actual NGS Elevation or ngvd29.txt file: _____	OPUS Ortho Height: <b>14.550</b>
Northing (Y) (feet): <b>1121283.351</b>	Easting (X) (feet): <b>591177.660</b>	Source of Latitude & Longitude: <b>OPUS SOLUTION</b>
Latitude: <b>27</b>	<b>25</b>	<b>5.88270</b>
DD°	MM'	SS"
Longitude: <b>81</b>	<b>12</b>	<b>1.19527</b>
DD°	MM'	SS"
Latitude (Decimal Degrees): <b>27.41830075</b>	Longitude (Decimal Degrees): <b>-81.20033202</b>	

#### RECOVERY DATA

How to Reach: **FROM THE PHYSICAL INTERSECTION OF COUNTY ROAD 721 AND US HIGHWAY 98, GO WEST ALONG US98 FOR 9.9 MILES, THE MARK IS ON THE RIGHT. BENCHMARK H 11A IS A SFWMD DISK SET IN A 1 1/2 INCH PIPE WITH A 10 INCH CONCRETE COLLAR 32.3 FEET NORTH OF THE EDGE OF PAVEMENT FOR US98, 15.2 FEET EAST OF WELL H-11A IN A METAL CABINET AND 8.3 FEET SOUTH OF A BARBEDWIRE FENCE.**

Description/Notes:

Notable Landmarks:

Other Source Benchmarks:

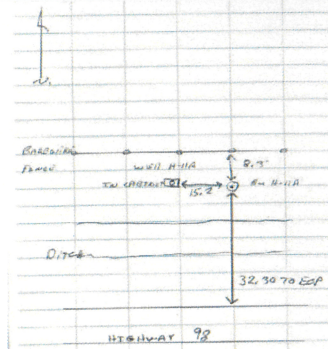
#### PICTURES

Aerial View of Overall Site



#### PICTURES

Site Sketch



Haywood, Joshua

From: opus <opus@ngs.noaa.gov>
Sent: Friday, August 28, 2020 7:53 AM
To: Haywood, Joshua
Subject: OPUS solution : 33322372.20o OP1598615493944

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

FILE: 33322372.20o OP1598615493944

NGS OPUS SOLUTION REPORT
=====

All computed coordinate accuracies are listed as peak-to-peak values.

For additional information:

https://can01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.ngs.noaa.gov%2FOPUS%2Fabout.jsp%23accuracy&data=02%7C01%7Cjosh.haywood%40t2ue.com%7Cd5dfc6d90dc748e86d2208d84b48edfb%7Ce64791d699864645a1a068c1175eda41%7C1%7C637342123901710966&data=SbexLa%2BAFE3gvjzmBQySxgnBZbZkDtzWdQ6DuTtzJl%3D&reserved=0

USER: josh.haywood@t2ue.com DATE: August 28, 2020
RINEX FILE: 3332237q.20o TIME: 11:52:54 UTC

SOFTWARE: page5 1801.18 master55.pl 160321 START: 2020/08/24 16:06:00
EPHEMERIS: igr21201.eph [rapid] STOP: 2020/08/24 22:40:00
NAV FILE: brdc2370.20n OBS USED: 13407 / 16061 : 83%
ANT NAME: TRMR8S NONE # FIXED AMB: 145 / 175 : 83%
ARP HEIGHT: 2.000 OVERALL RMS: 0.022(m)

REF FRAME: NAD\_83(2011)(EPOCH:2010.0000) ITRF2014 (EPOCH:2020.6470)

X: 866736.780(m) 0.007(m) 866735.942(m) 0.007(m)
Y: -5598993.591(m) 0.005(m) -5598992.019(m) 0.005(m)
Z: 2919431.776(m) 0.011(m) 2919431.612(m) 0.011(m)

LAT: 27 25 5.88270 0.007(m) 27 25 5.90311 0.007(m)
E LON: 278 47 58.80473 0.007(m) 278 47 58.78334 0.007(m)
W LON: 81 12 1.19527 0.007(m) 81 12 1.21666 0.007(m)
EL HGT: -11.479(m) 0.010(m) -13.047(m) 0.010(m)
ORTHO HGT: 14.550(m) 0.051(m) [NAVD88 (Computed using GEOID18)]

UTM COORDINATES STATE PLANE COORDINATES
UTM (Zone 17) SPC (0901 FLE)
Northing (Y) [meters] 3032783.220 341767.849
Easting (X) [meters] 480198.069 180191.311
Convergence [degrees] -0.09225000 -0.09225000
Point Scale 0.99960484 0.99994602
Combined Factor 0.99960664 0.99994782

US NATIONAL GRID DESIGNATOR: 17RML8019832783(NAD 83)

BASE STATIONS USED
PID DESIGNATION LATITUDE LONGITUDE DISTANCE(m)
DE9138 OKCB OKEECHOBEE CORS ARP N271557.715 W0805119.181 38080.9
DQ7965 FLWE WEDGEFIELD FL CORS ARP N282626.477 W0810533.176 113793.2
DG9798 PBCH WEST PALM CORS ARP N265046.638 W0801309.300 116089.5

NEAREST NGS PUBLISHED CONTROL POINT
AH8822 C 463 N272518.111 W0811225.573 768.2

BASE STATION INFORMATION
STATION NAME: okcb a 4 (Okeechobee; Okeechobee, Florida, U.S.A.)
MONUMENT: 495875001
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 -0.1235 0.0124 0.0173 VEL TIMES 10.6472 YRS
XYZ 0.0000 0.0000 0.0000 MON TO ARP
XYZ 0.0168 -0.1091 0.0570 ARP TO L1 PHASE CENTER
XYZ 901665.4328 -5601320.8227 2904442.9719 L1 PHS CEN @ 2020.6470
XYZ -0.0000 0.0000 0.0000 + XYZ ADJUSTMENTS

XYZ 901665.4328 -5601320.8227 2904442.9719 NEW L1 PHS CEN @ 2020.6470  
XYZ 901665.4160 -5601320.7136 2904442.9149 NEW ARP @ 2020.6470  
XYZ 901665.4160 -5601320.7136 2904442.9149 NEW MON @ 2020.6470  
LLH 27 15 57.73632 279 8 40.79740 -15.2077 NEW L1 PHS CEN @ 2020.6470  
LLH 27 15 57.73631 279 8 40.79743 -15.3319 NEW ARP @ 2020.6470  
LLH 27 15 57.73631 279 8 40.79743 -15.3319 NEW MON @ 2020.6470

STATION NAME: flwe a 1 (Wedgefield FL; Wedgefield, Florida USA)  
MONUMENT: NO DOMES NUMBER

XYZ 869051.4451 -5544931.6701 3019536.5503 MON @ 2010.0000 (M)  
XYZ -0.0120 -0.0006 0.0021 VEL (M/YR)  
NEU 0.0000 0.0000 0.0000 MON TO ARP (M)  
NEU 0.0014 -0.0002 0.0880 ARP TO L1 PHASE CENTER (M)  
NEU 0.0006 0.0002 0.0812 ARP TO L2 PHASE CENTER (M)  
XYZ -0.1278 -0.0064 0.0224 VEL TIMES 10.6472 YRS  
XYZ 0.0000 0.0000 0.0000 MON TO ARP  
XYZ 0.0116 -0.0759 0.0432 ARP TO L1 PHASE CENTER  
XYZ 869051.3290 -5544931.7523 3019536.6158 L1 PHS CEN @ 2020.6470  
XYZ -0.0000 -0.0000 -0.0000 + XYZ ADJUSTMENTS  
XYZ 869051.3290 -5544931.7524 3019536.6158 NEW L1 PHS CEN @ 2020.6470  
XYZ 869051.3173 -5544931.6765 3019536.5726 NEW ARP @ 2020.6470  
XYZ 869051.3173 -5544931.6765 3019536.5726 NEW MON @ 2020.6470  
LLH 28 26 26.49884 278 54 26.80193 -4.9993 NEW L1 PHS CEN @ 2020.6470  
LLH 28 26 26.49880 278 54 26.80194 -5.0873 NEW ARP @ 2020.6470  
LLH 28 26 26.49880 278 54 26.80194 -5.0873 NEW MON @ 2020.6470

STATION NAME: pbch a 4 (WEST PALM; West Palm Beach, Florida, U.S.A.)  
MONUMENT: NO DOMES NUMBER

XYZ 967386.2783 -5611812.2727 2863022.8618 MON @ 2010.0000 (M)  
XYZ -0.0115 0.0000 0.0025 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 -0.1228 0.0005 0.0266 VEL TIMES 10.6472 YRS  
XYZ 0.0000 0.0000 0.0000 MON TO ARP  
XYZ 0.0181 -0.1093 0.0562 ARP TO L1 PHASE CENTER  
XYZ 967386.1736 -5611812.3815 2863022.9446 L1 PHS CEN @ 2020.6470  
XYZ -0.0000 0.0000 0.0000 + XYZ ADJUSTMENTS  
XYZ 967386.1736 -5611812.3815 2863022.9446 NEW L1 PHS CEN @ 2020.6470  
XYZ 967386.1555 -5611812.2722 2863022.8883 NEW ARP @ 2020.6470  
XYZ 967386.1555 -5611812.2722 2863022.8883 NEW MON @ 2020.6470  
LLH 26 50 46.65865 279 46 50.67986 -16.7655 NEW L1 PHS CEN @ 2020.6470  
LLH 26 50 46.65864 279 46 50.67989 -16.8898 NEW ARP @ 2020.6470  
LLH 26 50 46.65864 279 46 50.67989 -16.8898 NEW MON @ 2020.6470

#### REMOTE STATION INFORMATION

STATION NAME: 3332 1

MONUMENT: NO DOMES NUMBER

XYZ 866735.8217 -5598992.1824 2919431.6883 MON @ 2020.6466 (M)  
NEU -0.0012 0.0011 2.0000 MON TO ARP (M)  
NEU 0.0012 -0.0011 0.0827 ARP TO L1 PHASE CENTER (M)  
NEU -0.0003 -0.0009 0.0713 ARP TO L2 PHASE CENTER (M)  
XYZ 0.2728 -1.7548 0.9199 MON TO ARP  
XYZ 0.0100 -0.0722 0.0391 ARP TO L1 PHASE CENTER  
XYZ 866736.1045 -5598994.0094 2919432.6473 L1 PHS CEN @ 2020.6470

BASELINE NAME: okcb 3332

XYZ 0.1233 0.1605 -0.0702 + XYZ ADJUSTMENTS  
XYZ 866736.2279 -5598993.8489 2919432.5771 NEW L1 PHS CEN @ 2020.6470  
XYZ 866736.2178 -5598993.7767 2919432.5380 NEW ARP @ 2020.6470  
XYZ 866735.9450 -5598992.0219 2919431.6181 NEW MON @ 2020.6470  
LLH 27 25 5.90325 278 47 58.78343 -10.9590 NEW L1 PHS CEN @ 2020.6470  
LLH 27 25 5.90321 278 47 58.78347 -11.0417 NEW ARP @ 2020.6470  
LLH 27 25 5.90325 278 47 58.78343 -13.0417 NEW MON @ 2020.6470

BASELINE NAME: flwe 3332

XYZ 0.1161 0.1638 -0.0784 + XYZ ADJUSTMENTS  
XYZ 866736.2206 -5598993.8456 2919432.5690 NEW L1 PHS CEN @ 2020.6470  
XYZ 866736.2106 -5598993.7734 2919432.5298 NEW ARP @ 2020.6470  
XYZ 866735.9378 -5598992.0186 2919431.6099 NEW MON @ 2020.6470  
LLH 27 25 5.90308 278 47 58.78319 -10.9667 NEW L1 PHS CEN @ 2020.6470  
LLH 27 25 5.90304 278 47 58.78323 -11.0494 NEW ARP @ 2020.6470  
LLH 27 25 5.90308 278 47 58.78319 -13.0494 NEW MON @ 2020.6470

BASELINE NAME: pbch 3332

XYZ 0.1203 0.1654 -0.0811 + XYZ ADJUSTMENTS  
XYZ 866736.2249 -5598993.8439 2919432.5662 NEW L1 PHS CEN @ 2020.6470  
XYZ 866736.2148 -5598993.7718 2919432.5271 NEW ARP @ 2020.6470  
XYZ 866735.9420 -5598992.0170 2919431.6072 NEW MON @ 2020.6470  
LLH 27 25 5.90302 278 47 58.78335 -10.9688 NEW L1 PHS CEN @ 2020.6470  
LLH 27 25 5.90298 278 47 58.78339 -11.0515 NEW ARP @ 2020.6470  
LLH 27 25 5.90302 278 47 58.78335 -13.0515 NEW MON @ 2020.6470



G-FILES

Axx2020 824 20 824  
 B2020 82416 5 20 8242239 1 page5 v1801.18IGS 132 1 2 27NGS 2020 828IFDDPX  
 ITRF2014\_2114 IGS 20200712  
 C00090004 349294709 9 -23286917 33 -149887032 19 X2370A3332X2370AOKCB  
 D 1 2 -3764331 1 3 2708761 2 3 -9250648

Axx2020 824 20 824  
 B2020 82416 5 20 8242239 1 page5 v1801.18IGS 132 1 2 27NGS 2020 828IFDDPX  
 ITRF2014\_2114 IGS 20200712  
 C00090003 23153795 7 540603421 30 1001049627 18 X2370A3332X2370AFLWE  
 D 1 2 -6253037 1 3 5861514 2 3 -8100516

Axx2020 824 20 824  
 B2020 82416 5 20 8242239 1 page5 v1801.18IGS 132 1 2 27NGS 2020 828IFDDPX  
 ITRF2014\_2114 IGS 20200712  
 C00090005 1006502135 13 -128202553 35 -564087188 18 X2370A3332X2370APBCH  
 D 1 2 -6733665 1 3 4878829 2 3 -9099257

POST-FIT RMS BY SATELLITE VS. BASELINE

OVERALL 02 05 06 09 10 12 13 15  
 okcb-3332| 0.023 0.021 0.031 0.027 0.026 0.027 0.020 0.021 0.019  
 17 18 19 20 21 24 25 27 29  
 okcb-3332| 0.035 0.035 0.024 0.017 0.019 0.019 0.027 0.031 0.024  
 32  
 okcb-3332| 0.038

OVERALL 02 05 06 09 10 12 13 15  
 flwe-3332| 0.021 0.018 0.043 0.017 0.031 0.028 0.020 0.022 0.019  
 17 18 19 20 21 24 25 27 29  
 flwe-3332| 0.021 0.034 0.018 0.019 0.030 0.019 0.023 0.028 0.020  
 32  
 flwe-3332| 0.028

OVERALL 02 05 06 09 10 12 13 15  
 pbch-3332| 0.020 0.018 0.028 0.024 0.021 0.019 0.024 0.020 0.017  
 17 18 19 20 21 24 25 27 29  
 pbch-3332| ... 0.036 0.021 0.017 0.019 0.017 0.026 ... 0.022  
 32  
 pbch-3332| 0.022

OBS BY SATELLITE VS. BASELINE

OVERALL 02 05 06 09 10 12 13 15  
 okcb-3332| 4644 450 59 173 45 259 265 545 665  
 17 18 19 20 21 24 25 27 29  
 okcb-3332| 29 93 98 440 124 321 249 102 553  
 32  
 okcb-3332| 174

OVERALL 02 05 06 09 10 12 13 15  
 flwe-3332| 4447 425 20 194 44 208 243 521 668  
 17 18 19 20 21 24 25 27 29  
 flwe-3332| 64 70 124 429 75 295 252 91 570  
 32  
 flwe-3332| 154

OVERALL 02 05 06 09 10 12 13 15  
 pbch-3332| 4316 439 71 152 30 227 269 489 645  
 17 18 19 20 21 24 25 27 29  
 pbch-3332| ... 95 129 428 89 344 238 ... 566  
 32  
 pbch-3332| 105

ITRF position of 3332 as determined by individual baselines

	X	Y	Z
okcb	866735.945	-5598992.022	2919431.618
flwe	866735.938	-5598992.019	2919431.610
pbch	866735.942	-5598992.017	2919431.607

Residuals of position determined by individual baselines from the final position

	X	Y	Z	East	North	Up
okcb	0.003	-0.003	0.006	0.003	0.004	0.006
flwe	-0.004	0.001	-0.002	-0.004	-0.001	-0.002
pbch	0.000	0.002	-0.005	0.001	-0.003	-0.004

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

0.0000007067	-0.0000001284	0.0000000790
-0.0000001284	0.0000116111	-0.0000005820
0.0000000790	-0.0000005820	0.0000038422

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

0.0000009230	0.0000006893	-0.0000013617
--------------	--------------	---------------



0.000006893 0.000049486 -0.000027343  
-0.000013617 -0.000027343 0.0000102884

Horizontal network accuracy = 0.00451 meters.  
Vertical network accuracy = 0.00629 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)	
OKCB	901666.25422	-5601322.30851	2904443.08260	2010.00
FLWE	869052.16310	-5544933.23543	3019536.72788	2010.00
PBCH	967386.99243	-5611813.86315	2863023.04799	2010.00

Position of reference station monument in NAD\_83(2011)(EPOCH:2010.0000).

	Xr(m)	Yr(m)	Zr(m)	
OKCB	901666.25422	-5601322.30851	2904443.08260	2010.00
FLWE	869052.16310	-5544933.23543	3019536.72788	2010.00
PBCH	967386.99243	-5611813.86315	2863023.04799	2010.00

Velocity of reference station monument in NAD\_83(2011)(EPOCH:2010.0000).

	Vx (m/yr)	Vy (m/yr)	Vz (m/yr)
OKCB	0.00118	0.00217	-0.00155
FLWE	0.00120	0.00039	-0.00096
PBCH	0.00113	0.00097	-0.00088

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)	
OKCB	34929.47422	-2328.71751	-14988.69340	2010.00
FLWE	2315.38310	54060.35557	100104.95188	2010.00
PBCH	100650.21243	-12820.27215	-56408.72801	2010.00

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

Northing (Y) [feet] 1121283.351  
Easting (X) [feet] 591177.660  
Convergence [degrees] -0.09225000  
Point Scale 0.99994602  
Combined Factor 0.99994782

\*\*\*\*\* 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://can01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fgeodesy.noaa.gov%2Fdatums%2Fnewdatums%2F&data=02%7C01%7Cjosh.haywood%40t2ue.com%7Cd5dfc6d90dc748e86d2208d84b48edfb%7Ce64791d699864645a1a068c1175eda41%7C1%7C0%7C637342123901710966&data=%2FEuG7IVHllgCTgvZi9%2BIIOHHJn4WQUp0Y2iJBZQ4REI%3D&reserved=0>

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

APPROX ORTHO HGT: 14.602 (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.

H-11A Raw Level Data (1).GSI

\*110001+00000000000000003 32...7+0000000000635396 332.27+0000000000049010  
390...+00000000000000003 391.27+0000000000000000  
\*110002+00000000000000001 32...7+0000000000310089 331.27+0000000000049069  
390...+00000000000000003 391.27+0000000000000000  
\*110003+00000000000000002 32...7+0000000000314846 332.27+0000000000054765  
390...+00000000000000003 391.27+0000000000000000  
\*110004+00000000000000003 32...7+0000000000635306 332.27+0000000000049648  
390...+00000000000000003 391.27+00000000000000001  
\*110005+00000000000000004 32...7+0000000001259656 331.27+0000000000043960  
390...+00000000000000003 391.27+00000000000000001  
\*410006+00000000?. . . . . 1  
\*110007+000000000000H11A 83..17+0000000000478530  
\*110008+000000000000H11A 32...7+0000000000108243 331.07+0000000000049439  
390...+00000000000000004 391.07+0000000000000000  
\*110009+00000TOP OF WELL 32...7+0000000000112884 332.07+0000000000029517  
390...+00000000000000004 391.07+0000000000000000  
\*110010+00000TOP OF WELL 573.07-0000000000004642 574.07+00000000000221127  
83..07+00000000000498453  
\*110011+00000TOP OF WELL 32...7+0000000000115303 331.07+0000000000027995  
390...+00000000000000003 391.07+0000000000000000  
\*110012+00000H11A CHK IN 32...7+0000000000109462 332.07+0000000000047921  
390...+00000000000000003 391.07+0000000000000000  
\*110013+00000H11A CHK IN 573.07+0000000000001199 574.07+00000000000445891  
83..07+00000000000478526



H-11A Raw Level Data (2).GSI

390. . . +000000000000000003 391. 07+0000000000000005  
\*110027+00000000000000TP6 573. 07+0000000000772250 574. 07+0000000047024101  
83. . 07+0000000000499183  
\*110028+00000000000000TP6 32. . . 7+0000000002419598 331. 07+0000000000052217  
390. . . +00000000000000003 391. 07+0000000000000003  
\*110029+000000000000H11-A 32. . . 7+0000000002402951 332. 07+0000000000072865  
390. . . +00000000000000003 391. 07+0000000000000004  
\*110030+000000000000H11-A 573. 07+0000000000788897 574. 07+0000000051846650  
83. . 07+0000000000478535  
\*110031+000000000000H11-A 32. . . 7+0000000002450562 331. 07+0000000000073795  
390. . . +00000000000000004 391. 07+0000000000000005  
\*110032+00000000000000TP7 32. . . 7+0000000002371521 332. 07+0000000000053145  
390. . . +00000000000000004 391. 07+0000000000000004  
\*110033+00000000000000TP7 573. 07+0000000000867938 574. 07+0000000056668734  
83. . 07+0000000000499185  
\*110034+00000000000000TP7 32. . . 7+0000000003473222 331. 07+0000000000049918  
390. . . +00000000000000003 391. 07+0000000000000003  
\*110035+00000000000000TP8 32. . . 7+0000000003355087 332. 07+0000000000047167  
390. . . +00000000000000003 391. 07+0000000000000006  
\*110036+00000000000000TP8 573. 07+0000000000986072 574. 07+0000000063497042  
83. . 07+0000000000501936  
\*110037+00000000000000TP8 32. . . 7+0000000003485951 331. 07+0000000000048864  
390. . . +00000000000000003 391. 07+0000000000000006  
\*110038+00000000000000TP9 32. . . 7+0000000003323666 332. 07+0000000000051139  
390. . . +00000000000000005 391. 07+0000000000000007  
\*110039+00000000000000TP9 573. 07+0000000001148357 574. 07+0000000070306660  
83. . 07+0000000000499661  
\*110040+00000000000000TP9 32. . . 7+0000000003482131 331. 07+0000000000049461  
390. . . +00000000000000003 391. 07+0000000000000004  
\*110041+000000000000C463B 32. . . 7+0000000003288320 332. 07+0000000000058992  
390. . . +00000000000000003 391. 07+0000000000000002 71. . . . +0000000000CHK IN  
\*110042+000000000000C463B 573. 07+0000000001342168 574. 07+0000000077077111  
83. . 07+0000000000490130

<b>Project File Data</b>		<b>Coordinate System</b>	
Name:	J:\2017\171204.05 - SFWMD USGS Phase 4 Wells\TBC\H11-A.vce	Name:	Default
Size:	48 KB	Datum:	WGS 1984
Modified:	8/11/2020 4:00:39 PM (UTC:-4)	Zone:	Default
Time zone:	Eastern Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:		Calibrated site:	
Comment 1:			
Comment 2:			
Comment 3:			

## Level Report

Imported file: [M 171204.05ED72820.GSI](#)

Instrument:

Creation option: Delta elevations

Description usage: Feature codes

### Run - 0002 Raw Observations

Standard error per kilometer of double leveling: 0.00230 ft

Standard error per turn/station setup: 0.00000 ft

Raw Misclosure: 0.02280 ft

Σ BS Distances: 3920.956 ft

Σ FS Distances: 3786.739 ft

Run Length: 7707.696 ft

Reduction: Adjusted Values

Create	Point ID	BS	HI	IS	FS	A Elevation	Raw Elevation	Correction	Adj. Elevation	Type	Distance	Description
✓	B463	✓ 5.23339 ft	57.75328 ft			0.00000 ft	52.51989 ft	0.00000 ft	52.51989 ft	Benchmark	337.128 ft	
✓	TP1				✓ 5.34399 ft	-0.11060 ft	52.40930 ft	-0.00200 ft	52.40730 ft	Computed	338.179 ft	
	TP1	✓ 4.92059 ft	57.32989 ft								348.445 ft	
✓	TP2				✓ 5.15349 ft	-0.23290 ft	52.17640 ft	-0.00402 ft	52.17238 ft	Computed	334.518 ft	
	TP2	✓ 4.45949 ft	56.63589 ft								348.727 ft	
✓	TP3				✓ 5.47209 ft	-1.01260 ft	51.16380 ft	-0.00603 ft	51.15777 ft	Computed	331.550 ft	
	TP3	✓ 4.65239 ft	55.81619 ft								318.494 ft	
✓	C463				✓ 6.81409 ft	-2.16170 ft	49.00210 ft	-0.00787 ft	48.99423 ft	Computed	304.235 ft	
	C463	✓ 6.12769 ft	55.12979 ft								341.258 ft	
✓	TP4				✓ 5.17419 ft	0.95350 ft	49.95560 ft	-0.00988 ft	49.94572 ft	Computed	336.167 ft	
	TP4	✓ 5.17189 ft	55.12749 ft								347.351 ft	
✓	TP5				✓ 4.94089 ft	0.23100 ft	50.18660 ft	-0.01189 ft	50.17471 ft	Computed	333.616 ft	
	TP5	✓ 4.72489 ft	54.91149 ft								348.409 ft	
✓	TP6				✓ 4.99339 ft	-0.26850 ft	49.91810 ft	-0.01391 ft	49.90419 ft	Computed	334.323 ft	
	TP6	✓ 5.22169 ft	55.13979 ft								241.959 ft	
✓	H11-A				✓ 7.28649 ft	-2.06480 ft	47.85330 ft	-0.01534 ft	47.83797 ft	Computed	240.295 ft	
	H11-A	✓ 7.37949 ft	55.23279 ft								245.056 ft	
✓	TP7				✓ 5.31449 ft	2.06500 ft	49.91830 ft	-0.01676 ft	49.90154 ft	Computed	237.152 ft	
	TP7	✓ 4.99179 ft	54.91009 ft								347.322 ft	
✓	TP8				✓ 4.71669 ft	0.27510 ft	50.19340 ft	-0.01878 ft	50.17462 ft	Computed	335.508 ft	
	TP8	✓ 4.88639 ft	55.07979 ft								348.594 ft	
✓	TP9				✓ 5.11389 ft	-0.22750 ft	49.96590 ft	-0.02080 ft	49.94510 ft	Computed	332.366 ft	
	TP9	✓ 4.94609 ft	54.91199 ft								348.212 ft	
✓	C 463				✓ 5.89919 ft	-0.95310 ft	49.01280 ft	-0.02280 ft	48.99000 ft	Benchmark	328.831 ft	

### Run - 0002 (N3) Reduced Observations

Observation	Status	Raw A Elevation	Correction	Final A Elevation	Setups	Length	Σ BS Readings	Σ FS Readings	Std. Error
▢ B463-TP1 (E15)	Enabled	-0.11060 ft	-0.00200 ft	-0.11260 ft	1	675.308 ft	5.23339 ft	5.34399 ft	0.00104 ft
▢ TP1-TP2 (E16)	Enabled	-0.23290 ft	-0.00202 ft	-0.23492 ft	1	682.963 ft	4.92059 ft	5.15349 ft	0.00105 ft
▢ TP2-TP3 (E17)	Enabled	-1.01260 ft	-0.00201 ft	-1.01461 ft	1	680.277 ft	4.45949 ft	5.47209 ft	0.00105 ft
▢ TP3-C463 (E18)	Enabled	-2.16170 ft	-0.00184 ft	-2.16354 ft	1	622.730 ft	4.65239 ft	6.81409 ft	0.00100 ft
▢ C463-TP4 (E19)	Enabled	0.95350 ft	-0.00200 ft	0.95149 ft	1	677.425 ft	6.12769 ft	5.17419 ft	0.00104 ft
▢ TP4-TP5 (E20)	Enabled	0.23100 ft	-0.00201 ft	0.22899 ft	1	680.967 ft	5.17189 ft	4.94089 ft	0.00105 ft
▢ TP5-TP6 (E21)	Enabled	-0.26850 ft	-0.00202 ft	-0.27052 ft	1	682.732 ft	4.72489 ft	4.99339 ft	0.00105 ft
▢ TP6-H11-A (E22)	Enabled	-2.06480 ft	-0.00143 ft	-2.06622 ft	1	482.254 ft	5.22169 ft	7.28649 ft	0.00088 ft
▢ H11-A-TP7 (E23)	Enabled	2.06500 ft	-0.00143 ft	2.06357 ft	1	482.207 ft	7.37949 ft	5.31449 ft	0.00088 ft
▢ TP7-TP8 (E24)	Enabled	0.27510 ft	-0.00202 ft	0.27308 ft	1	682.830 ft	4.99179 ft	4.71669 ft	0.00105 ft
▢ TP8-TP9 (E25)	Enabled	-0.22750 ft	-0.00201 ft	-0.22951 ft	1	680.960 ft	4.88639 ft	5.11389 ft	0.00105 ft
▢ TP9-C 463 (E26)	Enabled	-0.95310 ft	-0.00200 ft	-0.95510 ft	1	677.044 ft	4.94609 ft	5.89919 ft	0.00104 ft

### Run - 0002 (N3) Reduced Coordinates

Point ID	Status	Elevation
▢ B463	Enabled	52.51989 ft



<b>Project File Data</b>		<b>Coordinate System</b>	
Name:	J:\2017\171204.05 - SFWMD USGS Phase 4 Wells\TBC\H11-A.vce	Name:	Default
Size:	48 KB	Datum:	WGS 1984
Modified:	8/11/2020 4:00:39 PM (UTC:-4)	Zone:	Default
Time zone:	Eastern Standard Time	Geoid:	
Reference number:		Vertical datum:	
Description:		Calibrated site:	
Comment 1:			
Comment 2:			
Comment 3:			

## Level Report

Imported file: [M 171204.05ED81020.GSI](#)

Instrument:

Creation option: Delta elevations

Description usage: Feature codes

### Run - 0002 Raw Observations

Standard error per kilometer of double leveling: 0.00230 ft

Standard error per turn/station setup: 0.00000 ft

Raw Misclosure: -0.00043 ft

Σ BS Distances: 22.355 ft

Σ FS Distances: 22.235 ft

Run Length: 44.589 ft

Reduction: Raw Elevations

Create	Point ID	BS	HI	IS	FS	A Elevation	Raw Elevation	Misclosure	Adj. Elevation	Type	Distance	Description
✓	H11A	✓ 4.94389 ft	52.78186 ft			0.00000 ft	47.83797 ft	0.00000 ft	47.83797 ft	Benchmark	10.824 ft	
✓	TOP OF WELL				✓ 2.95169 ft	1.99220 ft	49.83017 ft			Computed	11.288 ft	
	TOP OF WELL	✓ 2.79949 ft	52.62966 ft								11.530 ft	
✓	H11A CHK IN				✓ 4.79209 ft	-1.99260 ft	47.83757 ft	-0.00043 ft	47.83800 ft	Benchmark	10.946 ft	

### Run - 0002 (N6) Reduced Observations

Observation	Status	Raw A Elevation	Correction	Final A Elevation	Setups	Length	Σ BS Readings	Σ FS Readings	Std. Error
H11A-TOP OF WELL (E31)	Enabled	1.99220 ft	0.00000 ft	1.99220 ft	1	22.113 ft	4.94389 ft	2.95169 ft	0.00019 ft
TOP OF WELL-H11A CHK IN (E32)	Enabled	-1.99260 ft	0.00000 ft	-1.99260 ft	1	22.476 ft	2.79949 ft	4.79209 ft	0.00019 ft

### Run - 0002 (N6) Reduced Coordinates

Point ID	Status	Elevation
H11A	Enabled	47.83797 ft
H11A CHK IN	Enabled	47.83800 ft

Date: 8/14/2020 2:10:02 PM	Project: J:\2017\171204.05 - SFWMD USGS Phase 4 Wells\TBC\H11-A.vce	Trimble Business Center
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# Office

## Project

28 August 2020

### INPUT

State Plane, NAD83  
0901 - Florida East, U.S. Feet  
Vertical - NAVD88, U.S. Feet

### OUTPUT

State Plane, NAD83  
0901 - Florida East, U.S. Feet  
Vertical - NGVD29 (Vertcon94), U.S. Feet

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## H-11A

1/1

<b>Northing/Y:</b> 1121283.627	<b>Northing/Y:</b> 1121283.627
<b>Easting/X:</b> 591177.302	<b>Easting/X:</b> 591177.302
<b>Elevation/Z:</b> 47.84	<b>Elevation/Z:</b> 48.992
<b>Convergence:</b> -0 05 32.10132	<b>Convergence:</b> -0 05 32.10132
<b>Scale Factor:</b> 0.999946018	<b>Scale Factor:</b> 0.999946018
<b>Combined Factor:</b> 0.999947814	<b>Combined Factor:</b> 0.999947758
Grid Shift (U.S. ft.): X/Easting = 0.0, Y/Northing = 0.0	

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Remark: