

PREPARED FOR



SPECIFIC PURPOSE SURVEY  
**SURVEYOR'S REPORT**  
VERTICAL DATUM UPGRADE PROJECT

WO #4600002187-WO10R2  
SAP PO# 9500006634

**WWGI**™



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## OVERVIEW OF PROJECT

### **Purpose of Project:**

Procure all materials to construct and install 43 staff gauges calibrated to the North American Vertical Datum of 1988 (NAVD88) at various sites identified by the Vertical Datum Project Manager. Establish a NAVD88 Reference Elevation on the inside deck of existing Telemetry Stations and stamp site specific data onto a brass tag, using a steel stamp die set. The brass tags were delivered to SFWMD and would be installed by SFWMD Field Personnel during site inspections.

### **Accuracy:**

Staff gauges have been set (adjusted) to the nearest two hundredth (.02') of a foot, and reference elevations established to the nearest hundredth (.01') of a foot. Elevations have been transferred from provided bench mark using a digital level, steel tape, and redundant measurements.

### **Bench Marks:**

A bench mark was provided by SFWMD at each location, unless otherwise noted, and used to establish the reference elevation and calibrate each staff gauge.

### **Survey Equipment Used:**

Topcon DL-502 (Digital Level)  
Fiberglass Digital Level Rods  
Conventional Level Rod

### **Vertical Datum Factor:**

The reference elevations and staff gauges, in this report, have been correctly calibrated to the North American Vertical Datum of 1988. The datum conversion to the National Geodetic Vertical Datum of 1929 (NGVD 29), as shown herein and engraved on each gauge, were provided by the SFWMD VDUP Project Manager.

### **Completion Date:**

Staff Gauge installation, calibration, and the establishment of telemetry station reference elevation was completed on April 15, 2016.

### **Construction:**

Each Staff Gauge is attached to a 4" O.D. galvanized steel pipe with stainless steel hardware. The pipes were driven to a depth to achieve required stability, to a minimum of 10', unless otherwise noted. Sections of pipes were driven by jack hammer, and attached with a galvanized threaded coupling.

# **Details of Staff Gauges**

## Staff Gauge Detail Summary Chart:

Gauges completed:

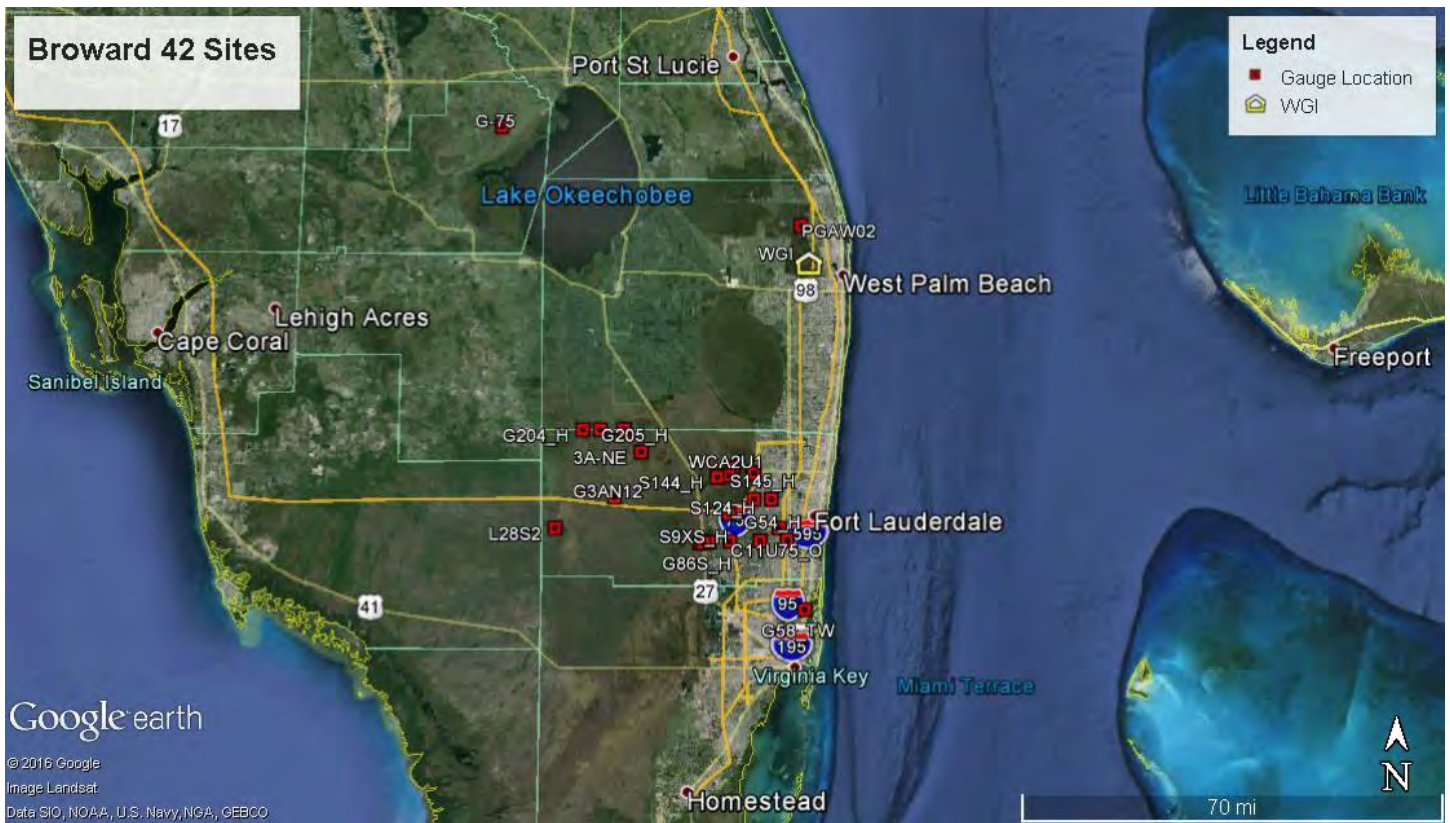
Staff Gauge Site	Latitude	Longitude	Benchmark Used	Benchmark Elevation NAVD88	Well Head Reference BM Elevation	Conversion Elevation to NGVD29
<b>2B-T1</b>	26° 07' 46.309"	80° 21' 58.179"	H695	8.42	13.00	<b>1.54</b>
<b>C11U75</b>	26° 03' 47.437"	80° 21' 48.717"	C11U75	7.748	10.56	<b>1.56</b>
<b>G75_HW</b>	27° 05' 30.176"	81° 00' 23.067"	FCE4544	25.84	27.79	<b>1.28</b>
<b>G86S_HW</b>	26° 03' 34.236"	80° 26' 05.026"	G86S	4.36	7.14	<b>1.50</b>
<b>G204_HW</b>	26° 19' 57.113"	80° 45' 53.221"	B50	13.11	20.11	<b>1.44</b>
<b>G204_TW</b>	26° 19' 55.93"	80° 45' 54.007"	B50	13.11	20.48	<b>1.44</b>
<b>G205_HW</b>	26° 19' 59.074"	80° 43' 00.333"	B53	12.53	20.50	<b>1.45</b>
<b>G205_TW</b>	26° 19' 57.793"	80° 43' 01.145"	B53	12.53	19.94	<b>1.45</b>
<b>G206_HW</b>	26° 20' 00.85"	80° 39' 08.923"	B57	12.28	18.48	<b>1.45</b>
<b>G206_TW</b>	26° 19' 59.684"	80° 39' 09.594"	B57	12.28	18.42	<b>1.45</b>
<b>S38_HW</b>	26° 13' 46.184"	80° 17' 55.974"	B43	17.506	18.62	<b>1.54</b>
<b>S38_TW</b>	26° 13' 46.182"	80° 17' 53.67"	B43	17.506	14.43	<b>1.54</b>
<b>S38A_HW</b>	26° 13' 48.933"	80° 17' 53.555"	B43	17.506	14.92	<b>1.54</b>
<b>S38C_TW</b>	26° 13' 42.088"	80° 17' 53.723"	B43	17.506	14.21	<b>1.54</b>
<b>S144_HW</b>	26° 13' 06.392"	80° 23' 51.664"	W464	15.92	17.79	<b>1.50</b>
<b>S144_TW</b>	26° 13' 05.251"	80° 23' 51.709"	W464	15.92	16.86	<b>1.50</b>
<b>S145_HW</b>	26° 13' 19.253"	26° 13' 19.253"	Y464	16.14	18.31	<b>1.52</b>
<b>S145_TW</b>	26° 13' 18.06"	80° 21' 56.696"	Y464	16.14	16.35	<b>1.52</b>
<b>G54_HW</b>	26° 05' 41.898"	80° 13' 49.898"	10.462	8.93	11.93	<b>1.60</b>
<b>G54_TW</b>	26° 05' 41.099"	80° 13' 45.249"	10.462	8.93	11.94	<b>1.60</b>
<b>G58_TW</b>	25° 53' 58.786"	80° 09' 43.676"	G58	7.456		<b>1.56</b>
<b>G86N_HW</b>	26° 03' 42.555"	80° 26' 04.957"	G86N	13.34	9.45	<b>1.50</b>
<b>S9_HW</b>	26° 03' 41.894"	80° 26' 35.755"	FCE1566	7.155	26.44	<b>1.50</b>
<b>S9_TW</b>	26° 03' 41.755"	80° 26' 37.527"	FCE1566	7.155	26.41	<b>1.50</b>
<b>S9A_HW</b>	26° 03' 42.189"	80° 26' 35.674"	FCE1566	7.155	11.25	<b>1.50</b>
<b>S9A_TW</b>	26° 03' 42.706"	80° 26' 38.475"	FCE1566	7.155	13.63	<b>1.50</b>
<b>S9XS_HW</b>	26° 03' 36.36"	80° 26' 35.65"	FCE1566	7.155	9.49	<b>1.50</b>
<b>S13AW_HW</b>	26° 03' 52.611"	80° 16' 55.03"	S.N.R 10	7.787	9.12	<b>1.61</b>
<b>S13AW_TW</b>	26° 03' 52.678"	80° 16' 51.652"	S.N.R 10	7.787	9.60	<b>1.61</b>
<b>S124_HW</b>	26° 07' 46.155"	80° 21' 56.05"	K697	6.99	8.68	<b>1.54</b>
<b>S124_TW</b>	26° 07' 45.128"	80° 21' 57.251"	K697	6.99	9.53	<b>1.54</b>
<b>S125_HW</b>	26° 09' 51.679"	80° 17' 52.443"	S125	6.457	10.32	<b>1.56</b>
<b>S125_TW</b>	26° 09' 49.681"	80° 17' 52.607"	S125	6.457	10.96	<b>1.56</b>
<b>S381_HW</b>	26° 03' 41.305"	80° 25' 12.524"	S381	6.049	9.44	<b>1.51</b>
<b>S381_TW</b>	26° 03' 42.213"	80° 25' 07.513"	S381	6.049	10.31	<b>1.51</b>

Staff Gauge Site	Latitude	Longitude	Benchmark Used	Benchmark Elevation NAVD88	Well Head Reference BM Elevation	Conversion Elevation to NGVD29
<b>3A-NE</b>	26°16'8.00"	80°36'52.40"	3ANE	11.25	17.05	<b>1.46</b>
<b>3A-NE_GW</b>	26°16'8.00"	80°36'52.40"	3ANE	11.25	18.05	<b>1.46</b>
<b>G3A12</b>	26°10'14.20"	80°40'56.00"	3A12	11.72	16.89	<b>1.46</b>
<b>L28S2</b>	26° 05' 37.32"	80° 50' 06.223"	L28S2	12.838	17.13	<b>1.46</b>
<b>LHPS_HW</b>	26° 09' 54.098"	80° 15' 04.526"	LHPS	9.649	11.70	<b>1.57</b>
<b>LHPS_TW</b>	26° 09' 51.768"	80° 15' 05.187"	LHPS	9.649	13.40	<b>1.57</b>
<b>PGAW02_GW1</b>	26° 50' 27.98"	80° 09' 59.03"	Brockway Az Mk	23.134	17.96	<b>1.52</b>
<b>PGAW02_GW2</b>	26° 50' 27.98"	80° 09' 59.03"	Brockway Az Mk	23.134	17.95	<b>1.52</b>
<b>WCA2U1</b>	26° 14' 27.31"	80° 21' 20.38"	WCA2U1	12.303	15.40	<b>1.52</b>
<b>WCA2U1_GW1</b>	26° 14' 27.31"	80° 21' 20.38"	WCA2U1	12.303	15.22	<b>1.52</b>
<b>WCA2U1_GW2</b>	26° 14' 27.31"	80° 21' 20.38"	WCA2U1	12.303	15.22	<b>1.52</b>
<b>S9X-N</b>	26°03'43.8"	80°26'35.00"	FCE 1566	7.155		1.50

- All Elevations shown are NAVD 88

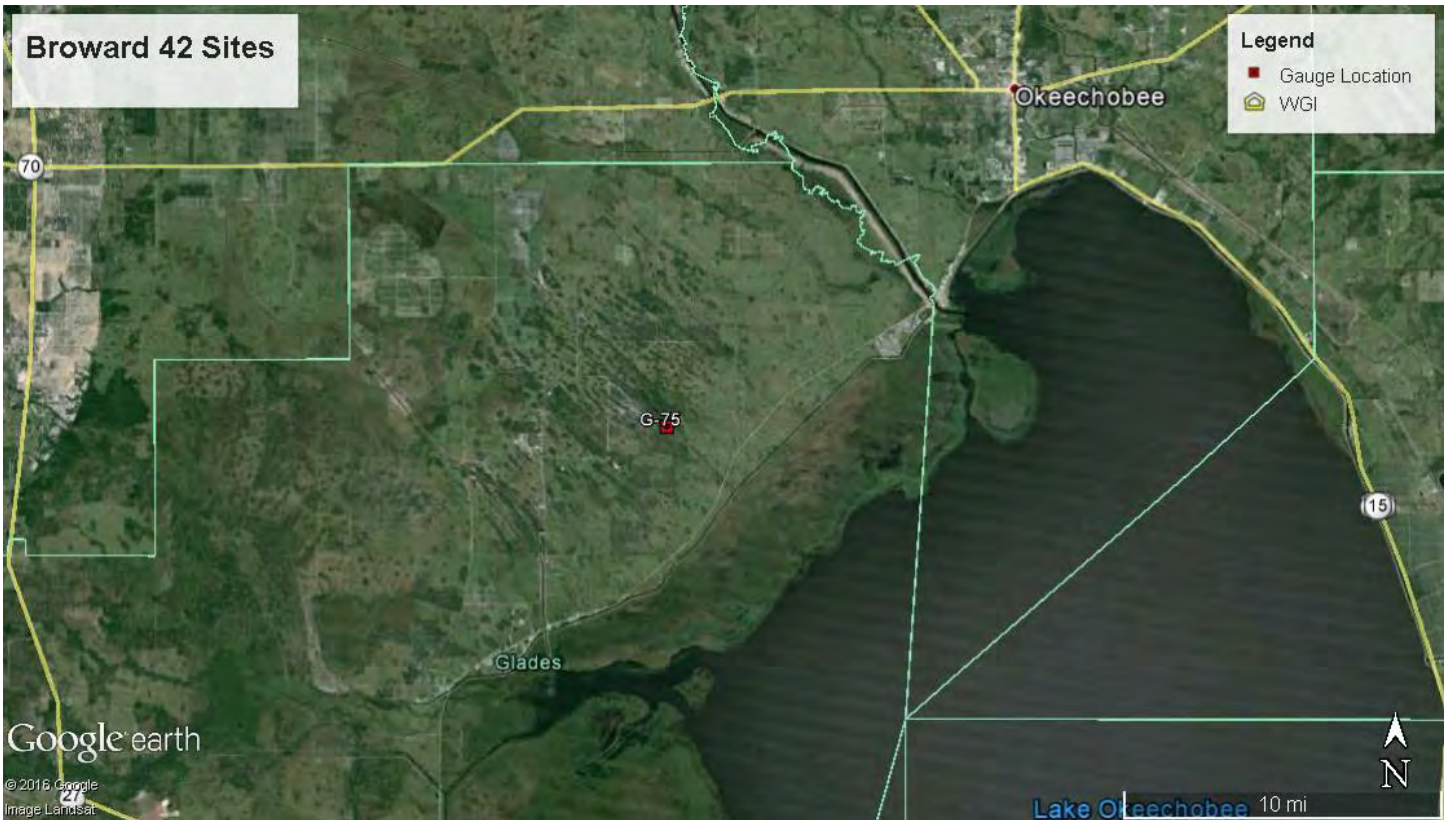
# Project Location Maps:

## Overall Site

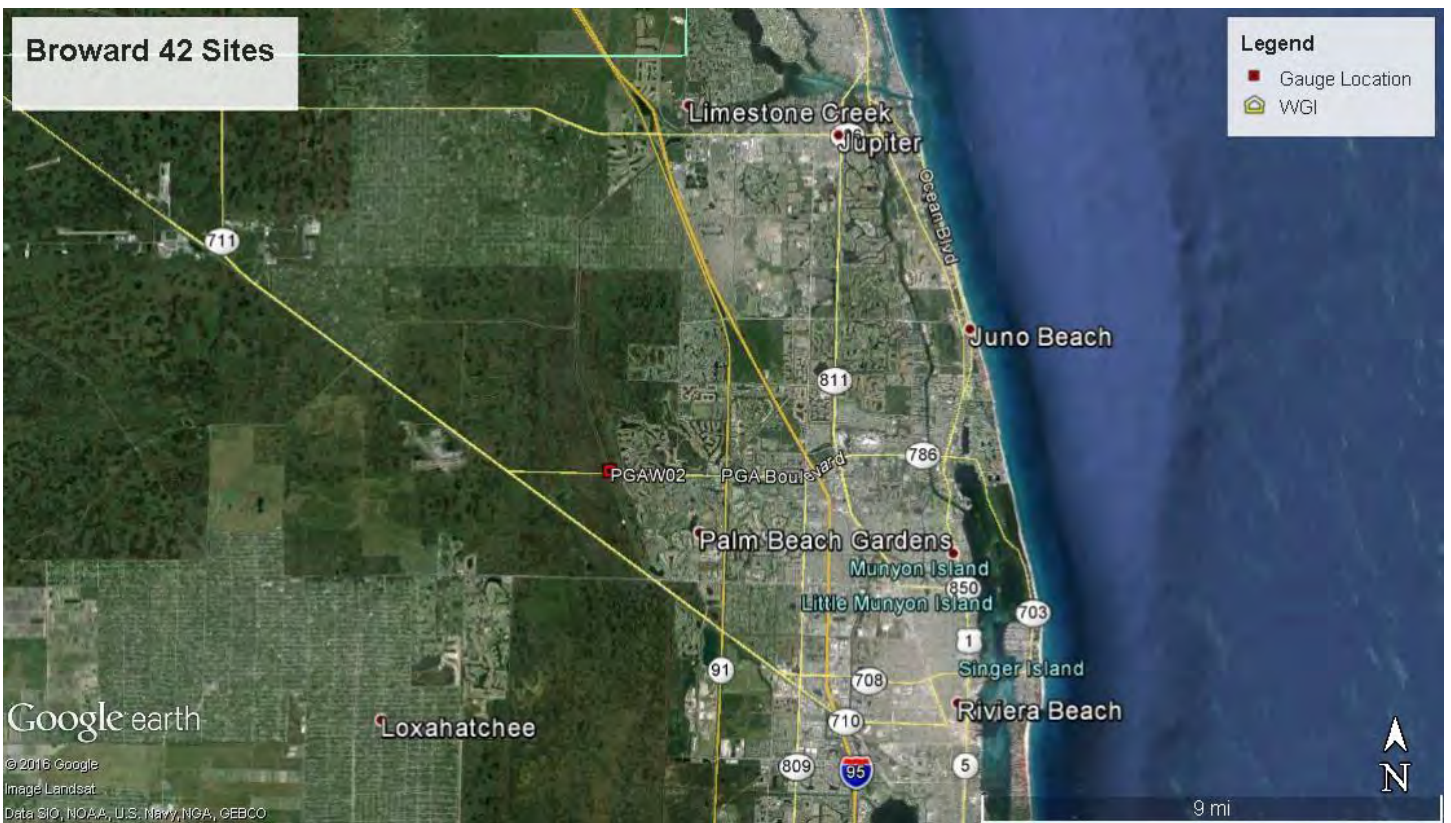




### Site Close Up 1 of 4:

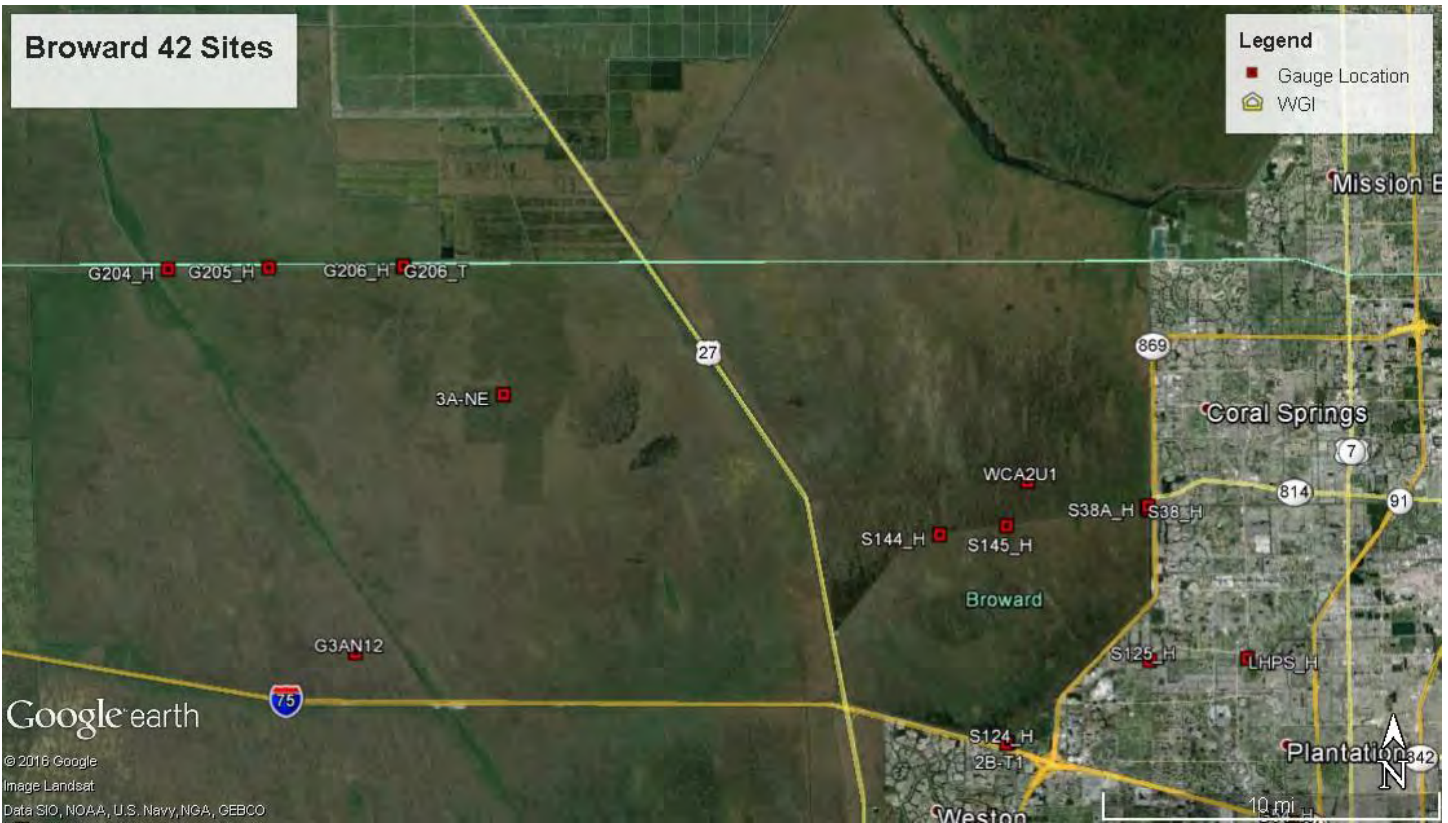


### Site Close Up 2 of 4:

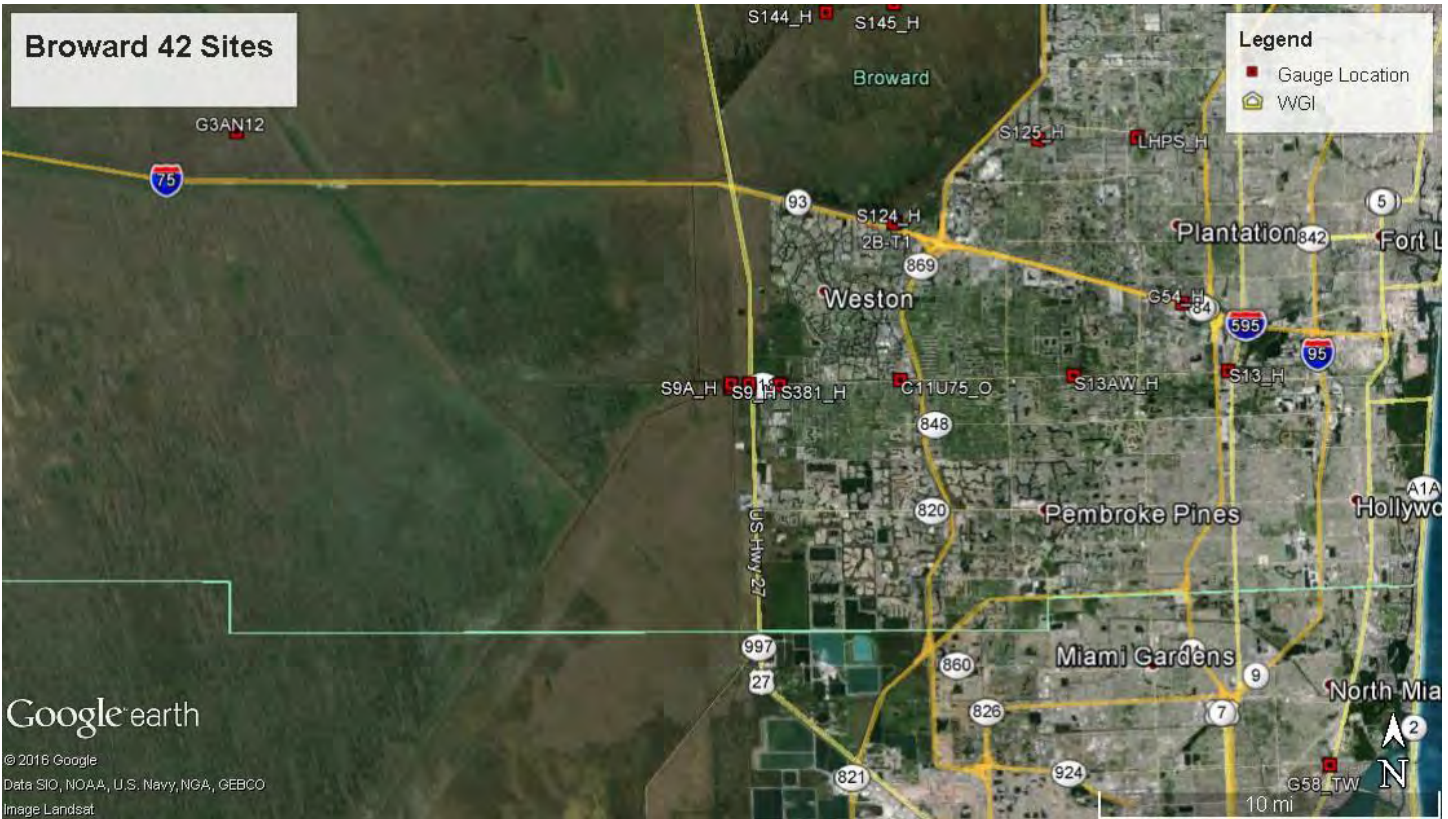




### Site Close Up 3 of 4:



### Site Close Up 4 of 4:





## Stage Recorder Site: WCA2U1

Party Chief: Ray Miller	Field Book Number: 613/ BK 11	Page Number: 43-43A
Benchmark Elevation (NAVD 88): 12.303	Date of Field Work: March 2, 2016	Datum Offset to NGVD 29: +1.52
Benchmark Agency: SFWMD	Benchmark Type: Precision Rod in 6in PVC	Benchmark Stamp: No Stamping
Reference Elevation (NAVD88): 15.40	Existing Tag Elevation (Datum): 16.99 NGVD29	
Latitude: 26° 14' 27.31"	Longitude: 80° 21' 20.38"	
Notes: Datum difference SFWMD +1.52 Field +1.59. Gauge braced to existing 2in pipe. Bench Mark used WCA2U1		
Removed Old Board: Existing gauge removed.		

Photographs:

Overall Site:



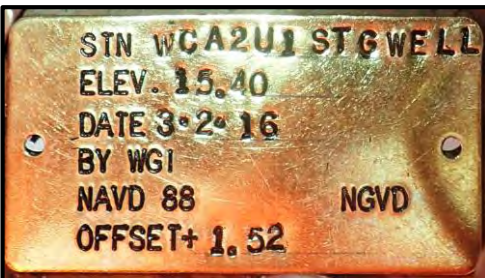
Benchmark Location:



Benchmark Close Up:



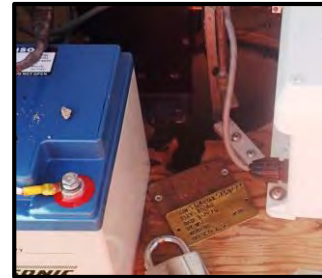
Brass Tag Close Up:



Reference Mark:



Brass Tag & Reference:



New Staff Gauge:

Front View:



Side View:



## Stage Recorder Site: WCA2U1\_GW1

<b>Party Chief:</b> Ray Miller	<b>Field Book Number:</b> 613/ BK 11	<b>Page Number:</b> 43-43A
<b>Benchmark Elevation (NAVD 88):</b> 12.303	<b>Date of Field Work:</b> March 2, 2016	<b>Datum Offset to NGVD 29:</b> +1.52
<b>Benchmark Agency:</b> SFWMD	<b>Benchmark Type:</b> Precision Rod in 6in PVC	<b>Benchmark Stamp:</b> No Stamping
<b>Reference Elevation (NAVD88):</b> 15.22		<b>Existing Tag Elevation (Datum):</b> 16.79 NGVD29
<b>Latitude:</b> 26° 14' 27.31"		<b>Longitude:</b> 80° 21' 20.38"
<b>Notes:</b> Datum difference SFWMD +1.52 Field +1.59. Bench Mark used WCA2U1		
<b>Removed Old Board:</b>		

Photographs:

Overall Site:



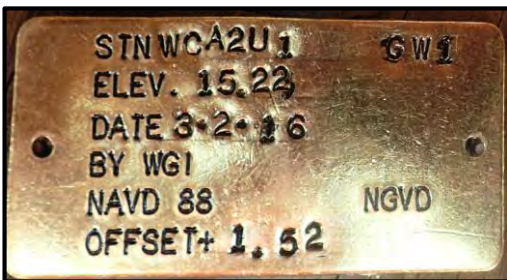
Benchmark Location:



Benchmark Close Up:



Brass Tag Close Up:



Reference Mark:



Brass Tag & Reference:

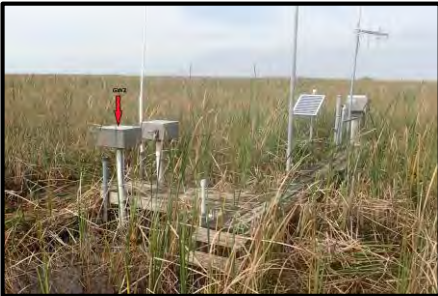


## Stage Recorder Site: WCA2U1\_GW2

Party Chief: Ray Miller	Field Book Number: 613/ BK 11	Page Number: 43-43A
Benchmark Elevation (NAVD 88): 12.303	Date of Field Work: March 2, 2016	Datum Offset to NGVD 29: +1.52
Benchmark Agency: SFWMD	Benchmark Type: Precision Rod in 6in PVC	Benchmark Stamp: No Stamping
Reference Elevation (NAVD88): 15.22	Existing Tag Elevation (Datum): 16.80 NGVD29	
Latitude: 26° 14' 27.31"	Longitude: 80° 21' 20.38"	
Notes: Datum difference SFWMD +1.52 Field +1.58. Bench Mark used WCA2U1		
Removed Old Board:		

Photographs:

Overall Site:



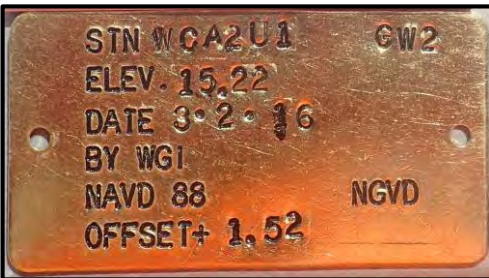
Benchmark Location:



Benchmark Close Up:



Brass Tag Close Up:



Reference Mark:



Brass Tag & Reference:





# **Project Results**

**Deliverable Items to South Florida Water Management District:**

The following items were delivered to South Florida Water Management District with this Surveyor’s Report. Neither the report nor the items listed below are complete without the other.

A CD Containing the following digital information:

- Survey Report in PDF Format
- Digital Photos of Set Staff Gauges
- Electronic Copy of Field Notes in PDF Format

**Legend:**

BM – Bench Mark  
NAVD 88 – North American Vertical Datum of 1988  
NGVD 29 – National Geodetic Vertical Datum of 1929  
NGS – National Geodetic Survey  
SFWMD – South Florida Water Management District  
ACOE – Army Corp of Engineers  
O.D. – Outside Diameter

**Survey Notes:**

1. Survey map & report, or copies thereof, are not valid without the signature and the original raised seal of a Florida Licensed Surveyor and Mapper.
2. Additions or deletions to the survey maps or reports by other than the signing party or parties are prohibited without the written consent of the signing party or parties.
3. The purpose of the survey is to show results of establishing reference elevations and calibrating staff gauges, as shown herein.
4. Latitude and longitude, as shown on page 5, was provided by the District and not verified as part of this survey.
5. Pursuant to client’s request, the face boards of old NGVD 29 staff gauges were removed when possible. Posts were not removed.
6. New 4” galvanized posts were driven to a minimum depth of 10’ below ground, unless otherwise noted in field notes. All pipes were structurally stable and plumb at time of installation.

**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 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. All NAVD88 staff gauges were calibrated to a vertical accuracy of +/- 0.02’ and reference elevations calibrated to a vertical accuracy of +/- 0.01’.

**Wantman Group, Inc.  
2035 Vista Parkway  
West Palm Beach, FL 33411  
L.B. Number 7055**

**By: \_\_\_\_\_  
Derek G. Zeman, PSM  
State of Florida  
Certificate No. LS5655**



3-2-16

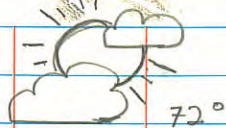
MILLER

LAST

PEREZ

SFWMD

WCA2U1



72°

3 WIRE +	HI	3 WIRE -	ELEV	ADS ELEV	DESC
			12.303		STAINLESS STEEL

5.22

5.185 5.185 17.488

5.15

2.31

2.265 2.265 15.223 15.22 REF MARK 2

2.22

2.14

2.10 2.10 17.323

2.06

2.14

2.105 2.105 15.218 15.22 REF MARK 2

2.07

2.40

2.37 2.37 17.588

2.34

2.32

2.19 2.19 15.398 15.40 REF MARK 2

2.06

2.24

2.12 2.12 17.518

2.0

5.25

5.23 5.23 12.288 VIN 2 SITE BM

5.21

31011071.10

6/3/43

DLIF

ROD IN 5 INCH PVC PIPE WCA2U1

WCA2U1 - GW2 EXS ELV 16.80 (1.577)

WCA2U1 - GW1 EXS ELV 16.79 (1.572)

WCA2U1 - STG WELL EXS ELV 16.99 (1.59)



3-2-16

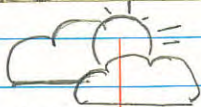
MILLER

LAST

PEREZ

SFWMD

WCA 2 U1



1:12

77°

+

HI

-

ELEV DISC

15.40 MARK @ WCA 2 U1 - STA

2.26

17.66

1.78

15.88

2.02

17.9

5.60

12.30

VIN @ SITE BM

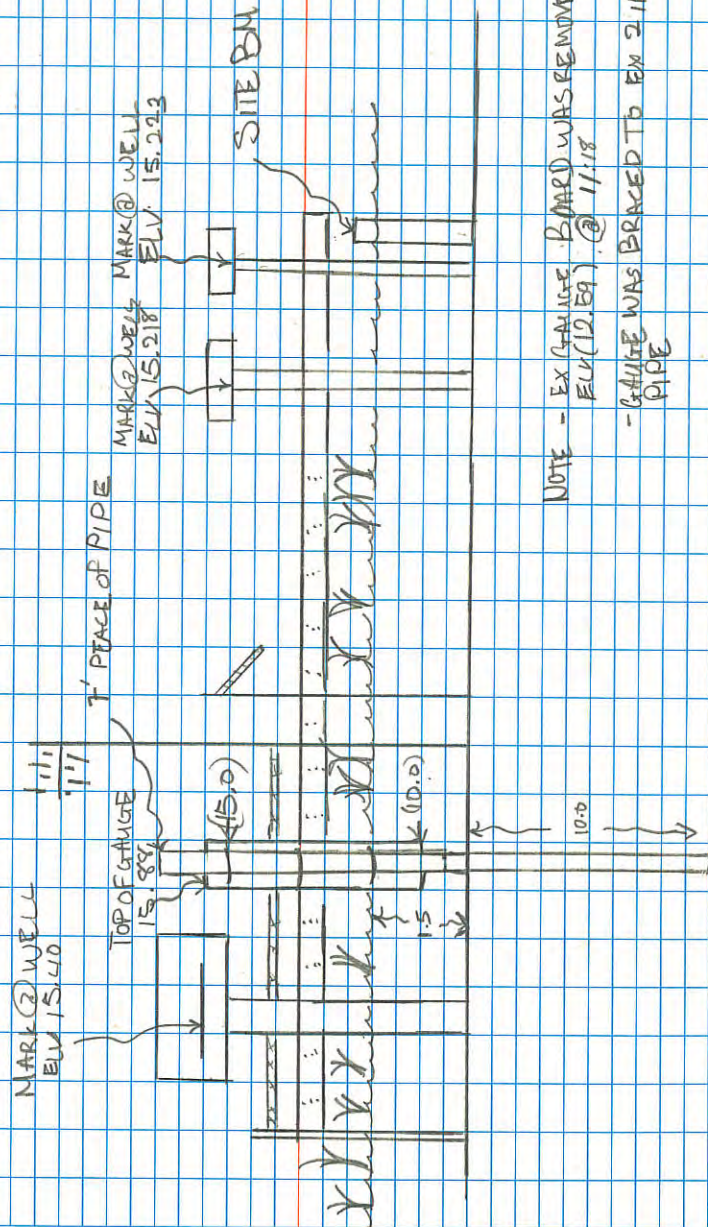
31011071.10

6/3/43

DL 17

WELL

NEW DATUM DIFF  
1.52



NOTE - EX GAUGE BARD WAS REMOVED  
ELV (12.59) @ 11/18

- GAUGE WAS BRACED TO EX 2 INCH  
PIPE