

2014

Prepared For

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Report Issue Date: 9/8/2014

SPECIFIC PURPOSE SURVEY



STAFF GAUGE AND REFERENCE ELEVATION REPORT

This document contains a surveyor's report and certification as to the accuracy of the methods used to determine NAVD88 elevations for staff gauges and stilling well reference elevations set by CivilSurv Design Group, Inc.

**SOUTH FLORIDA WATER MANAGEMENT DISTRICT
INFRASTRUCTURE MANAGEMENT BUREAU - SURVEY AND MAPPING SECTION
STAFF GAUGE INSTALLATION & RECALIBRATION SERVICES
HYDRAULIC & HYDROLOGY, DISCIPLINES #8, CONTRACT #4600002182**

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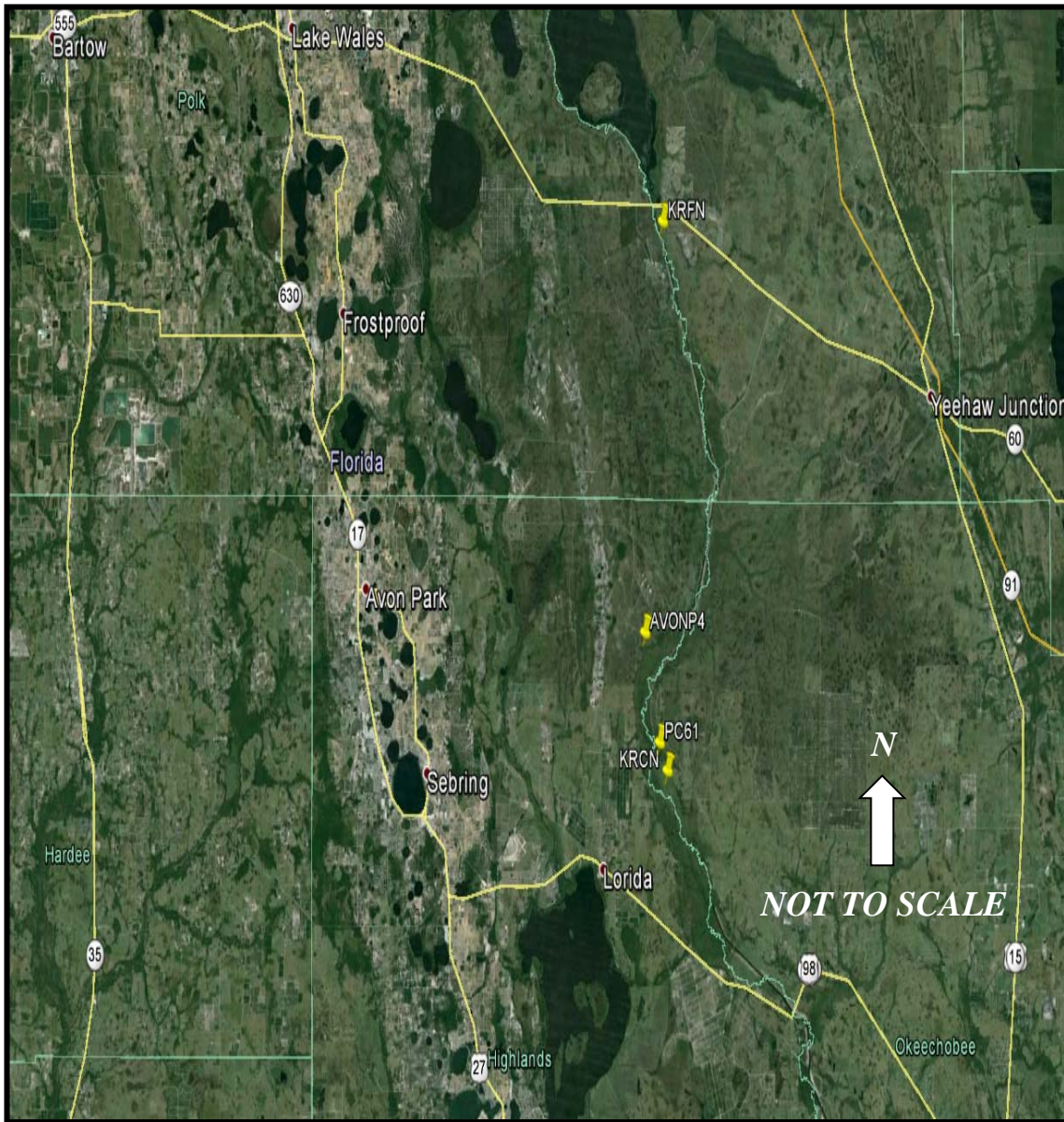
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PROJECT LOCATION MAP



STAFF GAUGE SITES:
1. AVONP4
2. KRCN
3. KRFN
4. PC61

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STAFF GAUGE AND REFERENCE ELEVATIONS DETAIL SUMMARY:

Gauge information provided by South Florida Water Management District, except as noted.

Staff Gauge Site	Latitude	Longitude	Benchmark Used	Benchmark Elevation	Datum Offset to NGVD29	Stilling Well Reference Elevations *
AVONP4	27.56519722	-81.2117528	AVPK4	43.04	+1.13	48.92
KRCNND	27.48955278	-81.18783611	KRCN	39.67	+1.16	43.52
KRCNNS	27.48955278	-81.18783611	KRCN	39.67	+1.16	43.55
KRCNNM	27.48955278	-81.18783611	KRCN	39.67	+1.16	43.44
KRFNNC	27.78833333	-81.19280833	KR1558GPS	56.228	+1.19	53.44
KRFNND	27.78833333	-81.19280833	KR1558GPS	56.228	+1.19	53.38
KRFNNM	27.78833333	-81.19280833	KR1558GPS	56.228	+1.19	53.45
KRFNNS	27.78833333	-81.19280833	KR1558GPS	56.228	+1.19	53.38
PC61	27.497225	-81.20389167	PC62	44.74	+1.15	44.75

Note:

***Denotes information developed in this survey by CivilSurv Design Group, Inc.**

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Specific Purpose Survey Report

Purpose:

Establish stilling well structure elevations at 4 sites and calibrate gauges (if needed) to NAVD88 datum; and establish a benchmark – also referred to as a reference elevation (RE) – on the platform of associated headwater and tailwater telemetry stations. Field Surveys for these gauges completed during the period of 8/08/14 through 9/03/14.

Leveling methods:

Leveling methods: Conventional differential leveling was performed in accordance with Florida Administrative Code 5J-17.051(3)(b)15.a. The maximum error of closure for this type of leveling is $0.05' \times \sqrt{\text{Distance in miles}}$. The error of closure achieved for the leveling performed meets or exceeds this specification.

Equipment used:

Wild NA-1

Vertical Datum:

The staff gauges listed in this report have been correctly calibrated to the North American Vertical Datum 1988 (NAVD88) as of September 3, 2014.

Sources of Data:

Benchmarks were provided by South Florida Water Management District. Information on the specific benchmarks can be obtained from the S.D.E.R.A. Website: <http://my.sfwmd.gov/sderawebapp/gis/sderamain.jsp>

Surveyor's Note:

Vertical closures obtained by comparison to converted existing NGVD'29 reference elevation tags. Party Chief and Field Book information reported herein is for consultant reference only. Each site had multiple crew visits, and stamping date is one of the on-site days.

Surveyor's Certificate:

This staff gauge elevations and stilling well reference elevations specific purpose survey (consisting of a cover, index and 21 numbered pages) is certified to the South Florida Water Management District. This report is not valid without the original signature and raised seal. All staff gauges contained in this Surveyor's Report were calibrated to a vertical accuracy of +/- 0.05'.

This is to certify that this staff gauge elevations and stilling well reference elevations specific purpose survey report was made under my responsible charge and meets the minimum technical requirements as set forth in Chapter 5J-17 of the Florida Administrative Code.

Report Issue Date: September 8, 2014

Robert N. Johnson, PSM 6540
Senior Project Surveyor
CivilSurv Design Group, Inc.
Certificate of Authorization Number: LB-7805

Date
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Field Notes Site: AVONP4

802.70

TECA WILD NA 2 520817
 NAVD83
 86°

KEMPAIKS
 S.W.M.D. ALUM. DEC IN CONCRETE "LXBBZA 2.008"
 LEFT: 275128'S CORN. B.II.D.9

DET TURN PIN

DET TURN PIN

WOOD NIPS

TURN PIN

TURN PIN

WOOD NIP

09.02.2011
 CORBETT
 EASTON X
 BASED

SP. FLA WATER MAN. DUST
 AVONP4
 RE - ELEVATE B.M. & WELL

HT	EL	BM
47.358	47.358	PIEL
49.118	49.118	
48.658	48.658	
48.178	48.178	
45.578	45.578	
45.678	45.678	
44.008	44.008	

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Field Notes Site: AVONP4

DATE	BY	JOB	INSTRUMENT	REMARKS
09.03.2014	COLEBEN ERSTON BEREED	So. Fla. Water, MAL DIST. AVON P4	EMMEL 45955	
5:14		(3)	(3)	ONCEK N.L.
TP 12				Wood NUB
TP 13				TURN PIN
				TURN PIN
				SET WOODS NUB
				TURN PIN
				TURN PIN

802.72



Field Notes Site: AVONP4

802.73

NAVID88 86°					
WOOD PINS	REMARKS				
Sea Wood Pins					
Tuan Pin					
VIEW PIN					
Wood Hub					
TUAN PIN					
SEA WOOD PINS					

09.03.2014 Simeon	SO. FLA. NAT. MAN. DIST. AVONP4				
TP 17	NEE	CD	ELEV.	BOREL	
T 6.46	47.858	T 6.38	44.513		
M 7.535		M 5.40			
B 4.55		B 4.18			
A 5.825		A 5.46			
T 6.47		T 6.11			
M 5.44		M 5.09			
B 4.41		B 4.07			
A 5.44		A 5.09			
T 5.78		T 5.64			
M 4.24		M 4.70			
B 3.31		B 3.76			
A 4.25		A 4.70			
T 6.68		T 7.38			
M 5.44		M 6.32			
B 4.60		B 5.26			
A 5.43		A 6.32			
T 6.55		T 5.71			
M 5.88		M 7.895			
B 4.84		B 4.02			
A 5.68		A 7.895			
T 5.75		T 6.97			
M 4.61		M 5.80			
B 3.53		B 4.63			
A 4.61		A 5.80			
TP 23					

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Field Notes Site: AVONP4

802.74

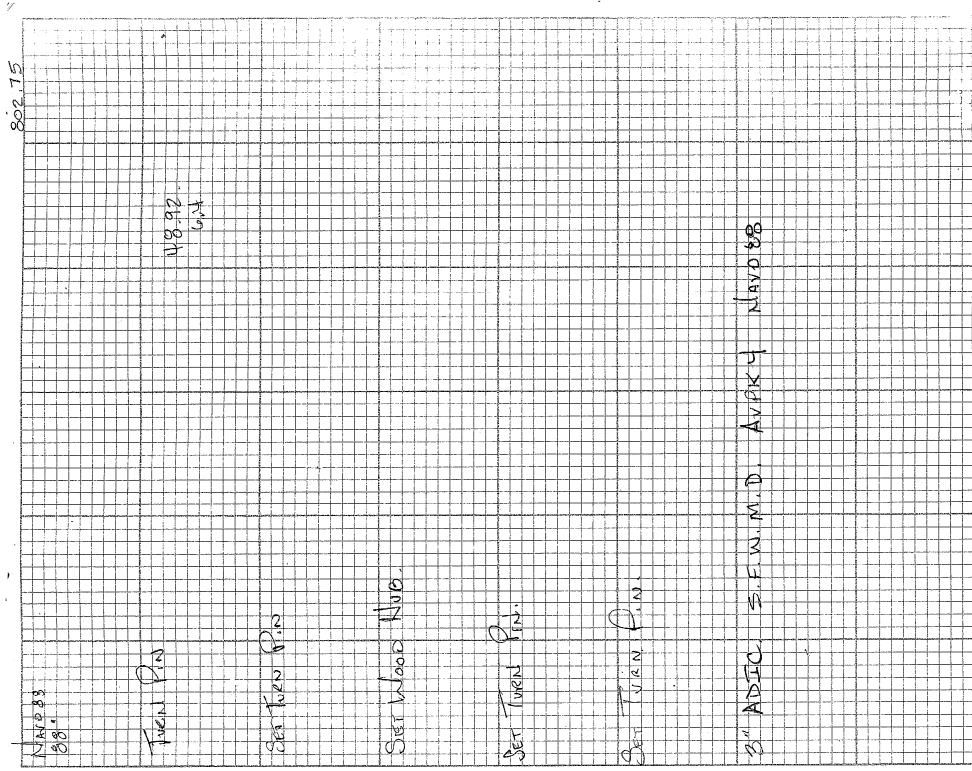
N. 1/4 D. 88 802.74 DET WOOD NUTS
DET TURN PIN
DET TURN PIN
DET ALBON NUTS
DET TURN PIN
DET TURN PIN
DET TURN PIN

0516.5 20214 JAMES CREED S. 1/4 W. 1/4 M. 1/4 D. 1/4 AVON P4	EL = 42.218	BOREL
T 1 13 M 3.120 B 7.217 A 8.120	M 4.150 A 3.18 B 2.24 A 3.18	T 5.88 M 4.945 B 4.101 A 4.945
T 6.14 M 5.205 B 4.77 A 5.705	T 5.46 M 4.515 B 3.57 A 4.515	T 7.59 M 6.66 B 5.73 A 4.66
T 7.65 M 6.72 B 5.79 A 4.65	T 8.05 M 7.12 B 6.19 A 5.05	T 9.09 M 8.03 B 7.07 A 6.03
T 10.13 M 9.15 B 8.16 A 7.15	T 10.15 M 9.15 B 8.16 A 7.15	T 11.19 M 10.23 B 9.29 A 8.29
T 12.23 M 11.23 B 10.23 A 9.23	T 13.27 M 12.27 B 11.27 A 10.27	T 14.31 M 13.31 B 12.31 A 11.31

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Field Notes Site: AVONP4



8/13/2014
DAME CREEK

Soc. FLA. NAT. MARL DIST. No. P4

STA	(+)	HI	EL	BM/IC
TP29			53.798'	
	T 6.33	53.703		
	M 5.305			
	P 4.28			
	A 5.305			
	T 5.94	58.823	53.773	
	M 5.025			
	P 4.11			
	A 5.025			
	T 2.20	59.103	52.888	
	M 1.22			
	P 1.29			
	A 1.22			
	T 5.46	48.603	44.063	
	M 4.535			
	P 3.611			
	A 4.535			
	T 6.83	49.608	43.813	
	M 5.85			
	P 4.87			
	A 5.85			
BM AVPK4			43.04	
			0.028' PER IN RUN	
TP29		12.275' USE	43.851	
			0.016' ALTIMETER CR	

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Stage Recorder Site: KRCNND

Party Chief: T. CORBETT	Field Book Number: 802	Page Number: 68
Benchmark Elevation (NAVD 88): 39.67	Date of Field Work: 8/21/2014	Datum Offset to NGVD 29: +1.16
Benchmark Agency: SFWMD	Benchmark Type: BRASS DISC	Benchmark Stamp: KRCN
Reference Elevation (NAVD88): 43.52	Existing Tag Elevation (NGVD29): 44.70	
Latitude: 27.48955278	Longitude: -81.18783611	
Notes: Removed Old Board: N/A		

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: KRCNNS

Party Chief: T. CORBETT	Field Book Number: 802	Page Number: 68
Benchmark Elevation (NAVD 88): 39.67	Date of Field Work: 8/21/2014	Datum Offset to NGVD 29: +1.16
Benchmark Agency: SFWMD	Benchmark Type: BRASS DISC	Benchmark Stamp: KRCN
Reference Elevation (NAVD88): 43.55	Existing Tag Elevation (NGVD29): 44.74	
Latitude: 27.48955278	Longitude: -81.18783611	
Notes: Removed Old Board: N/A		

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: KRCNNM

Party Chief: T. CORBETT	Field Book Number: 802	Page Number: 68
Benchmark Elevation (NAVD 88): 39.67	Date of Field Work: 8/21/2014	Datum Offset to NGVD 29: +1.16
Benchmark Agency: SFWMD	Benchmark Type: BRASS DISC	Benchmark Stamp: KRCN
Reference Elevation (NAVD88): 43.44	Existing Tag Elevation (NGVD29): 44.63	
Latitude: 27.48955278	Longitude: -81.18783611	
Notes: Removed Old Board: N/A		

Photographs:

Overall Site:



Benchmark Location:



Benchmark Close Up:



Brass Tag Close Up:



Reference Mark:



Brass Tag & Reference:



New Staff Gauge:

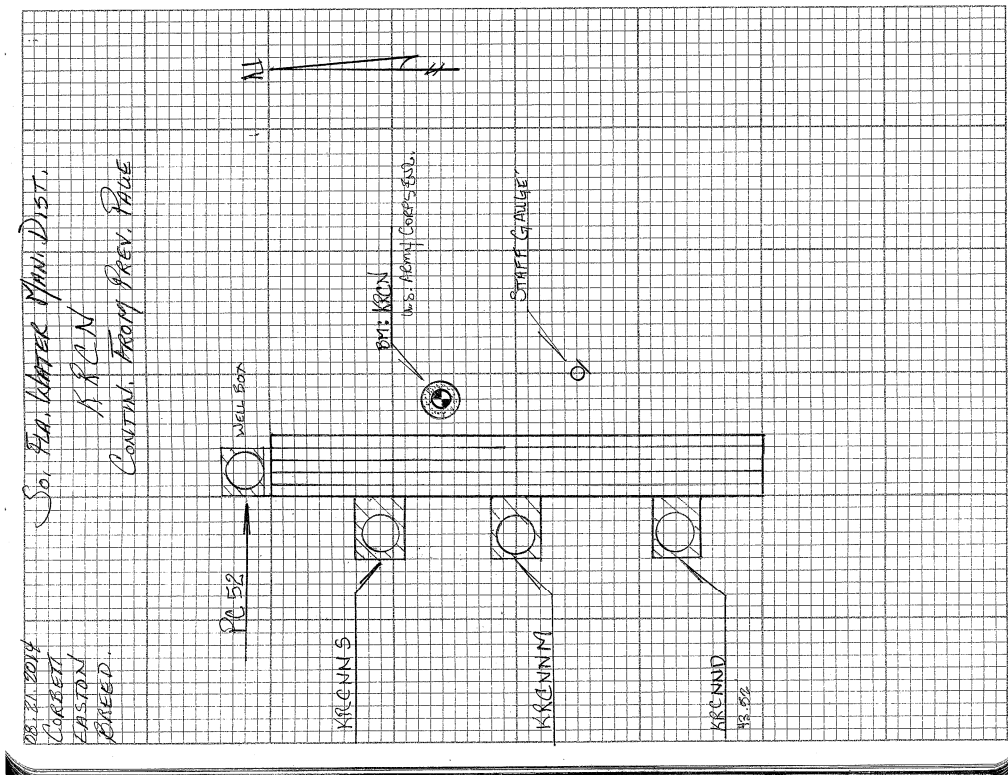
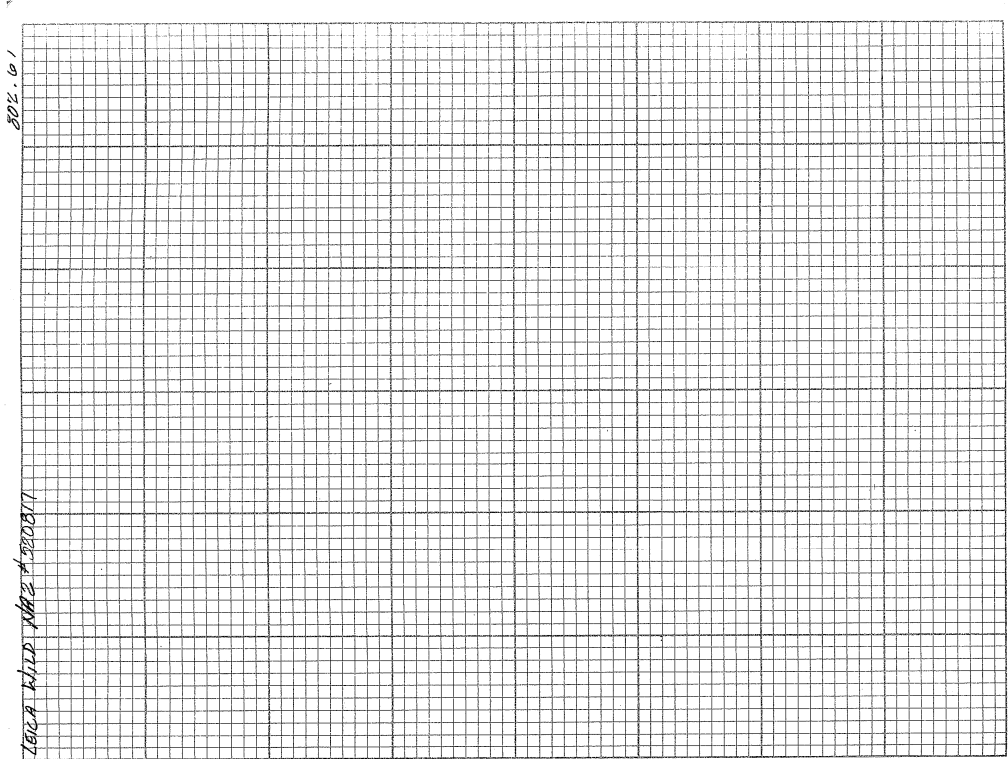
Front View:



Side View:



Field Notes Site: KRCN



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Stage Recorder Site: KRFNNC

Party Chief: W. ARMSTRONG	Field Book Number: 802	Page Number: 63
Benchmark Elevation (NAVD 88): 56.228	Date of Field Work: 8/14/2014	Datum Offset to NGVD 29: +1.19
Benchmark Agency: USACE	Benchmark Type: BRASS DISC	Benchmark Stamp: KR1558GPS
Reference Elevation (NAVD88): 53.44	Existing Tag Elevation (NGVD29): 54.57	
Latitude: 27.78833333	Longitude: -81.19280833	
Notes: Removed Old Board: N/A		

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: KRFNND

Party Chief: W. ARMSTRONG	Field Book Number: 802	Page Number: 63
Benchmark Elevation (NAVD 88): 56.228	Date of Field Work: 8/14/2014	Datum Offset to NGVD 29: +1.19
Benchmark Agency: USACE	Benchmark Type: BRASS DISK	Benchmark Stamp: KR1558GPS
Reference Elevation (NAVD88): 53.38	Existing Tag Elevation (NGVD29): 54.57	
Latitude: 27.78833333	Longitude: -81.19280833	
Notes: Removed Old Board: N/A		

Photographs:

Overall Site:



Benchmark Location:



Benchmark Close Up:



Brass Tag Close Up:



Reference Mark:

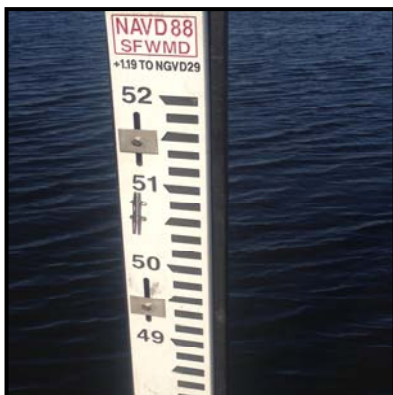


Brass Tag & Reference:



New Staff Gauge:

Front View:



Side View:



Stage Recorder Site: **KRFNNM**

Party Chief: W. ARMSTRONG	Field Book Number: 802	Page Number: 63
Benchmark Elevation (NAVD 88): 56.228	Date of Field Work: 8/14/2014	Datum Offset to NGVD 29: +1.19
Benchmark Agency: USACE	Benchmark Type: BRASS DISC	Benchmark Stamp: KR1558GPS
Reference Elevation (NAVD88): 53.45	Existing Tag Elevation (NGVD29): 54.57	
Latitude: 27.78833333	Longitude: -81.19280833	
Notes:		
Removed Old Board: N/A		

Photographs:

Overall Site:



Benchmark Location:



Benchmark Close Up:



Brass Tag Close Up:



Reference Mark:

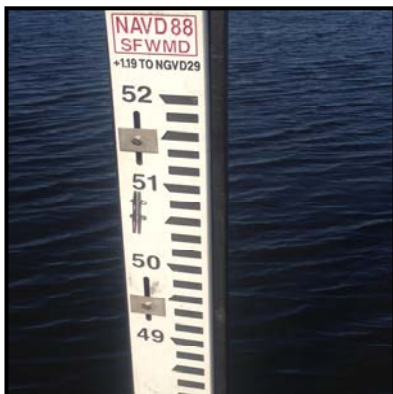


Brass Tag & Reference:



New Staff Gauge:

Front View:



Side View:



Stage Recorder Site: KRFNNS

Party Chief: W. ARMSTRONG	Field Book Number: 802	Page Number: 63
Benchmark Elevation (NAVD 88): 56.228	Date of Field Work: 8/14/2014	Datum Offset to NGVD 29: +1.19
Benchmark Agency: USACE	Benchmark Type: BRASS DISC	Benchmark Stamp: KR1558GPS
Reference Elevation (NAVD88): 53.38	Existing Tag Elevation (NGVD29): 54.57	
Latitude: 27.78833333	Longitude: -81.19280833	
Notes:		
Removed Old Board: N/A		

Photographs:

Overall Site:



Benchmark Location:



Benchmark Close Up:



Brass Tag Close Up:



Reference Mark:

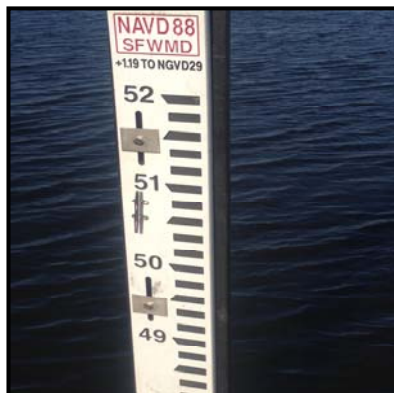


Brass Tag & Reference:



New Staff Gauge:

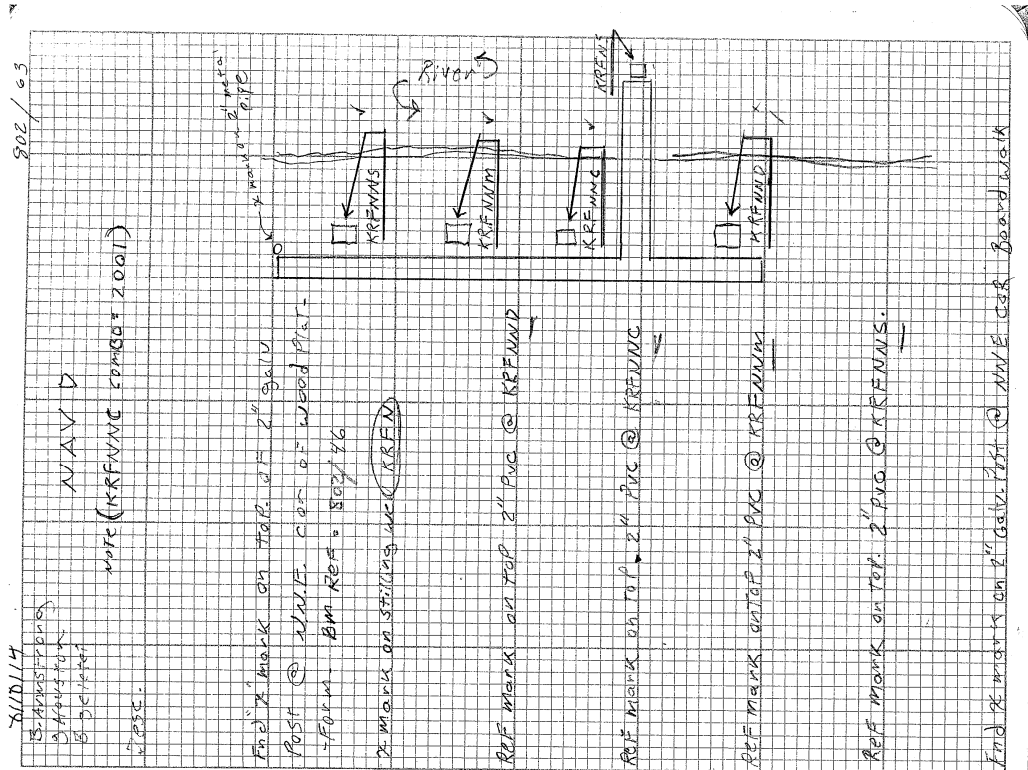
Front View:



Side View:



Field Notes Site: KRFN



SEWARD / CHK KRFN

Sta	HI	PIV	8" / 10"
BM A 3.514	56.732		51.218
TP-1			53.612
TP-2			53.378
TP-3			53.435
TP-4			53.449
			53.380
			51.903
			51.415
			51.418

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Stage Recorder Site: PC 61

Party Chief: T. CORBETT	Field Book Number: 802	Page Number: 66
Benchmark Elevation (NAVD 88): 44.74	Date of Field Work: 8/20/2014	Datum Offset to NGVD 29: +1.15
Benchmark Agency: SFWMD	Benchmark Type: STEEL ROD	Benchmark Stamp: PC 62
Reference Elevation (NAVD88): 44.75	Existing Tag Elevation (NGVD29): 46.16	
Latitude: 27.497225	Longitude: -81.20389167	
Notes: BM PC 62 IS NOT AN ONSITE BENCHMARK		
Removed Old Board: N/A		

Photographs:

Overall Site:



Benchmark Location:



Benchmark Close Up:



Brass Tag Close Up:



Reference Mark:



Brass Tag & Reference:



New Staff Gauge:

Front View:



Side View:



Field Notes Site: PC61

802.66

LEILA WILSON #585317
NAVD83

REMARKS
D.P.T.L.C.

TURN PIN

TURN PIN

TURN PIN

ON WOOD PLATFORM FOR WELL RECORDER BOX. (BAD SHAPE)
 - 4.10' TO TOW. TOW EL = 40.65'
 - .45' TOW TO TOP OF BM PC61. BM.
 STAFF 5" TALL ADJ. TO REFLECT NEW ELEV.

08.20.2014
Consistent
Elevation
Adjustments
HOUSTON EMBED (+)
STA
BM PC61

So. FLA. WATER MAN. DIST.
PC 61

HI	C-2	EVEN	REMARK
46.36'			
	11.06'		
TP	7.45'	35.30'	
	42.75'		
	8.67'	34.08'	
TP	10.01'		
	44.75'	10.53'	
	44.89'		
	11.33'	33.56'	
		14'	44.75'

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Field Notes Site: PC61

802.67

LEICA NA2 # 520817
 NAVD 88

REMARKS:
 2' ON WOOD PLATFORM ABV PC61.

TURN PIN

TURN PIN

TURN PIN

D.P.J. L.C.

08/20/2014
 SAME QTRD.

Sta. PEA KVA MAN. DIST.
 PC 601

STA	CHS	HGT	CS	ELEN	BOWEL
1	+ .45			= 44.75	
TP	+ 9.20	= 45.20	= 11.68		= 33.52
TP	+ 10.06	= 42.70	= 8.12		= 34.60
TP	+ 12.21		= 11.75		= 32.91
BM PC 602			= .39		= 44.73
					44.74

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