





VERTICAL CONTROL SURVEY REPORT

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

FINAL

December, 2007

VERTICAL CONTROL SURVEY REPORT Monitoring Well Reference Elevations

for:

South Florida Water Management District

3301 Gun Club Road West Palm Beach, FL 33406

by:

WOOLPERT, INC.

Florida Certificate of Authorization # 6777 2121 Ponce de León Blvd., Suite 200 Coral Gables, Florida 33134 (305) 567-9900/fax: (305) 567-9009

Prepared by:

John A. Cestnick, PSM

Florida Professional Surveyor and Mapper # 5994

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Overview of the Project

This survey request consisted of establishing or verifying elevations to third-order National Geodetic Survey (NGS) Standards at District Recorder Well Sites. This survey request is associated with the District's Vertical Datum Upgrade Project (VDUP).

There were two main tasks to this survey.

- 1. Set reference elevations and tags at each well using a local site benchmark referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).
- 2. For those sites that did not have a local benchmark, set a concrete monument and establish elevations referencing the North American Vertical Datum of 1988 (NAVD88), and then compute a conversion NGVD29 elevation.

The project began requiring a total of six sites that needed a new local benchmark, and a total of 59 separate sites requiring tags to be placed on wells. As the project was being completed, changes to the scope of services was required due to situation found in the field. For example, some sites were identified to have missing or destroyed benchmarks, additional leveling was required, and some sites were found to have additional wells than were identified.

To address these changes, a second work-order has been assigned for these additional tasks, as well as to perform similar services at additional site locations. The original list of sites to complete include the following.

2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	AIR19 ALL1 ALL2 BFARM * BLACK ** BOG527 * C31SW CAST * EXOTFI * INRCTY KIRCOF KISSD * KISSFS	15. MOSSPK * 16. OAKISL * 17. OS181 ** 18. OSF53 19. REDYCK 20. REEDC 21. S57-SCA 22. S58-SCA 23. S59-SCA 24. S59W 25. S60-SCA 26. S61-SCA 27. S61W	29. S63-SCA 30. SCBR 31. SCPE 32. SCPN 33. SCPS 34. SCSS 35. SW15 36. TAFTOR ** 37. TMRNCH 38. TB1 39. TB2 40. TB3 41. TOHO1	43. TOHO4 44. TOHO5 45. TOHO6 46. TOHO7 47. TOHO8 48. TOHO10 49. TOHO12 50. TOHO13 51. TOHO14 52. TOHO15 53. TOHO16 54. TOHOE 55. TOHOW	57. WR8 * 58. WR9 * 59. WRLGTE *
	KISSFS MAKO	27. S61W 28. S62-SCA	41. TOHO1 42. TOHO2	55. TOHOW 56. WR6 *	
		20. 002 007	12. 13.132	000	

^{*} Benchmark was set at site (11 total).

Not part of this report are the following sites for the following reasons.

Site	Notes:
BFARM	 Incorrect elevation was set on tag. This site will be included with the second work-order deliverable.
BLACK	Site was decommissioned.
KISSFS	 Incorrect elevation was set on tag. This site will be included with the second work-order deliverable.
OS181	Site was decommissioned.
REEDC	 REEDC was removed from the project after the District was informed that it was completed under a different contract.
S61W	 Site was overlooked. This site will be included with the second work-order deliverable.
TAFTOR	Site was decommissioned.
TMRNCH	 Site was found to have existing tag, and tag elevations were verified. Tags were set by "EE &

^{**} Site was decommissioned / destroyed (3 total).

Site	Notes:
TB1	 COON". GW1 was set on 5-18-05 with a verified reference elevation of 72.17, and GW2 was set on 1-6-06 with a verified reference elevation of 71.89 feet. Site was found to have existing tag, and tag elevations were verified. Tags were set by "K&S"
	dated "8-8-06". The east well was verified at 104.35 feet. The west well was verified at 104.02 feet.
TB2	 Site was found to have existing tag, and tag elevations were verified. Tags were set by "K&S" dated "8-9-06". GW1 well was verified at 104.09 feet. GW2 well was verified at 105.24 feet.
TB3	• TB3 was inaccessible due to high water. After discussing this with the District, it was assumed to also be completed by "K&S" as were TB1 and TB2.
TOHO13	 Site was found to have existing tag, and tag elevations were verified. Tag was set by "K&S" dated "8-9-07". Stamped elevation was 65.099 feet.
WRLGTE	 Incorrect elevation was set on tag. This site will be included with the second work-order deliverable.

List of Project Deliverables

In addition to four signed and sealed hard copies of this survey report, the following deliverables were also a part of this project.

- 1. The survey report in Adobe Acrobat format.
- 2. Digital photos named by sites.
- 3. Scanned copies of field notes.
- 4. Any other digital files associated with the survey.
- 5. Completed District benchmark description sheet for all set marks.

These digital deliverables will be delivered on CD along with the final signed and sealed copy of this report.

Date of Survey

All site field operations took place between August 28 and October 19, 2007.

Equipment Used

Wild NA2002 digital levels were used for all leveling. Latitude and Longitudes were determined for each site using Trimble Pro-XR sub-meter GPS equipment. These Latitudes and Longitudes were then converted to Florida State Plane Coordinates, East Zone, using the United States Army Corps of Engineers software CORPSCON version 6.0.1.

Project Location

All well site locations were in Osceola and Orange Counties, Florida.



Survey Methodology

Woolpert began by setting concrete monuments at each of the locations that did not have a benchmark on site. Monuments consisted of an 8 inch PVC pipe, 40 inches long, filled with poured concrete with an aluminum South Florida Water Management District survey cap. Rebar rods were also added to the mixture for durability.

Following building the concrete monuments, reconnaissance was done to find existing NGS control stations. Once found, elevation were established by using two NGS stations, performing closed level loops ensuring that NGS monument published elevations matched.

At each site, Woolpert used the local site benchmark to set reference elevations for each found well. All well sites had a previously marked reference point on the well. Woolpert used the local benchmark to perform a closed loop level run from the benchmark to the reference mark to establish a NGVD29 elevation on the well reference point. If the local benchmark did not have a published NGVD29 elevation, Woolpert used the sites latitude, longitude, and NAVD88 elevation to find a NGVD29 elevation using the United States Army Corps of Engineers software CORPSCON version 6.0.1. To determine the sites benchmark latitude and longitude, Woolpert used a Trimble Pro-XR GPS receiver. This GPS receiver obtains differential GPS corrections from Coast Guard stations, resulting in horizontal accuracies of approximately 1 meter, at one sigma.

If a staff gauge existed at the site, Woolpert obtained the water level, the staff gauge reading, and

recorded the time and date of those measurements.

Following all leveling and positioning, Woolpert then attached metal tags to each found well. Each tag was stamped with: Site name, well designation, elevation, date, firm name, and reference datum (NGVD29 in all cases).

Summary of Leveling Results

BOG527 was set using NGS station L715017, a Second-Order Class I benchmark with published elevation of 92.90 feet (NAVD88), and NGS station L715018, a Second-Order Class I benchmark with published elevation of 91.84 feet (NAVD88). Leveling began at station L715017, passed through BOG527, and ended on L715018 with a leveled elevation of 91.88. Total leveling distance was 5.8 miles resulting in a closure of 0.04 (0.07 allowable). Resulting elevation for BOG527 was 80.95 feet NAVD88. This was converted using the United States Army Corps of Engineers software CORPSCON version 6.0.1 to derive a NGVD29 elevation of 81.88 feet.

CAST was set using NGS station Q507, a Second-Order Class I benchmark with published elevation of 73.65 feet (NAVD88), and NGS station P507, a Second-Order Class I benchmark with published elevation of 76.01 feet (NAVD88). Leveling began at station Q507, passed through CAST, and ended on P507 with a leveled elevation of 76.01. Total leveling distance was 1.65 miles resulting in a closure of 0.04 (0.04 allowable). Resulting elevation for CAST was 70.65 feet NAVD88. This was converted using the United States Army Corps of Engineers software CORPSCON version 6.0.1 to derive a NGVD29 elevation of 71.85 feet.

EXOFTI was set using NGS station S507, a Second-Order Class I benchmark with published elevation of 73.08 feet (NAVD88), and NGS station R507, a Second-Order Class I benchmark with published elevation of 70.67 feet (NAVD88). Leveling began at station S507, passed through EXOFTI, and ended on R507 with a leveled elevation of 70.65. Total leveling distance was 1.54 miles resulting in a closure of 0.02 (0.04 allowable). Resulting elevation for EXOFTI was 70.92 feet NAVD88. This was converted using the United States Army Corps of Engineers software CORPSCON version 6.0.1 to derive a NGVD29 elevation of 72.14 feet.

KISSD was set using NGS station F514, a Second-Order Class I benchmark with published elevation of 74.41 feet (NAVD88), and NGS station N512, a Second-Order Class I benchmark with published elevation of 65.69 feet (NAVD88). Leveling began at station F514, passed through KISSD, and ended on N512 with a leveled elevation of 65.69. Total leveling distance was 1.46 miles resulting in a closure of 0.00 (0.04 allowable). Resulting elevation for KISSD was 60.48 feet NAVD88. This was converted using the United States Army Corps of Engineers software CORPSCON version 6.0.1 to derive a NGVD29 elevation of 61.42 feet.

MOSSPK was set using NGS station R575, a Second-Order Class I benchmark with published elevation of 66.29 feet (NAVD88), and NGS station C802-008, a Second-Order Class I benchmark with published elevation of 66.88 feet (NAVD88). Leveling began at station R575, passed through MOSSPK, and ended on C802-008 with a leveled elevation of 66.91. Total leveling distance was 0.98 miles resulting in a closure of 0.03 (0.03 allowable). Resulting elevation for MOSSPK was 67.49 feet NAVD88. This was converted using the United States Army Corps of Engineers software CORPSCON version 6.0.1 to derive a NGVD29 elevation of 68.53 feet.

OAKISL was set using NGS station D466, a Second-Order Class I benchmark with published elevation of 155.80 feet (NAVD88), and NGS station I4-72A42E RM2, a Second-Order Class I benchmark with

published elevation of 189.29 feet (NAVD88). Leveling began at station D466, passed through OAKISL, and ended on I4-72A42E RM2 with a leveled elevation of 189.33. Total leveling distance was 6.7 miles resulting in a closure of 0.04 (0.08 allowable). Resulting elevation for OAKISL was 108.24 feet NAVD88. This was converted using the United States Army Corps of Engineers software CORPSCON version 6.0.1 to derive a NGVD29 elevation of 109.10 feet.

WR6 was set using NGS station OS134, a Second-Order Class I benchmark with published elevation of 70.65 feet (NAVD88), and NGS station OS135, a Second-Order Class I benchmark with published elevation of 64.75 feet (NAVD88). Leveling began at station OS134, passed through WR6, and ended on OS135 with a leveled elevation of 64.71. Total leveling distance was 12.8 miles resulting in a closure of 0.06 (0.11 allowable). Resulting elevation for WR6 was 63.78 feet NAVD88. This was converted using the United States Army Corps of Engineers software CORPSCON version 6.0.1 to derive a NGVD29 elevation of 64.82 feet.

WR8 was set using NGS station OS134, a Second-Order Class I benchmark with published elevation of 70.65 feet (NAVD88), and NGS station OS135, a Second-Order Class I benchmark with published elevation of 64.75 feet (NAVD88). Leveling began at station OS134, passed through WR8, and ended on OS135 with a leveled elevation of 64.71. Total leveling distance was 11.6 miles resulting in a closure of 0.06 (0.10 allowable). Resulting elevation for WR8 was 69.79 feet NAVD88. This was converted using the United States Army Corps of Engineers software CORPSCON version 6.0.1 to derive a NGVD29 elevation of 70.83 feet.

WR9 was set using NGS station OS134, a Second-Order Class I benchmark with published elevation of 70.65 feet (NAVD88), and NGS station OS135, a Second-Order Class I benchmark with published elevation of 64.75 feet (NAVD88). Leveling began at station OS134, passed through WR9, and ended on OS135 with a leveled elevation of 64.71. Total leveling distance was 11.6 miles resulting in a closure of 0.06 (0.10 allowable). Resulting elevation for WR9 was 69.32 feet NAVD88. This was converted using the United States Army Corps of Engineers software CORPSCON version 6.0.1 to derive a NGVD29 elevation of 70.36 feet.

Monitoring Well Site Information Summary

In Section 2, all well site information is presented in the same format.

EXAMPLE:

Sit		Sensor				
Example			GW1			
Latitude 28° 23' 31.937"	Longitude 81° 22' 31.937"		Northing 1472251	Easting 538267		
Section 13	Township 24	Range 29	County Orange	Quad Lake Jessamine		
Benchmark Informat	tion:					
Name	Existing / Set		NAVD88	NGVD29		
BOG527	Set		80.851	81.876		
Reference Point Information: Stamped Elevation (NGVD29) 87.50 9-21-07 Woolpert, Inc. Note: Reference mark at edge of wood as marked.						
Staff Gauge Informa Water Elevation (NGVD29)	tion: Gauge Reading	g Tim	ne of Reading	Date of Reading		

NOTES:

79.928

1. Latitude and longitude were derived at the benchmark location, and is given to assist in locating the site. It is not meant to accurately locate each well.

09:25

- 2. The Northing and Easting were obtained by using CORPSCON to convert the latitude and longitude to Florida State Plane Coordinates, East Zone, Adjustment of 1990 (NAD83/90) HARN.
- 3. All measurements and elevations are in feet unless otherwise noted.

80.05

4. Reference point elevations were determined by using the stated NGVD29 elevation. NGVD29 elevations were calculated using CORPSCON to convert the stated NAVD88 elevation. In some cases the local benchmark only had a NGVD29 elevation, so it was used and no NAVD88 elevation is stated.

9-21-07

Surveyor's Notes:

THIS SURVEY IS NOT VALID WITHOUT THE SIGNATURE AND ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.

THIS REPORT OF SURVEY CONSISTS OF FOUR SECTIONS AS OUTLINED WITHIN THE SUMMARY OF CONTENTS AND IS NOT VALID UNLESS ATTACHED TO THE OTHERS IN THEIR ENTIRETY.

ADDITIONS OR DELETIONS TO SURVEY MAPS AND REPORTS BY OTHER THAN THE SIGNING PARTY OR PARTIES IS PROHIBITED WITHOUT THE WRITTEN CONSENT OF THE SIGNING PARTY OR PARTIES.

Surveyor and Mapper in Responsible Charge: John A. Cestnick Professional Surveyor and Mapper, License Number: 5994		
Signed: (For, and on behalf of the firm Woolpert, Inc.)	Seal:	

Section 2: Monitoring Well Site Information

Site Name Sensor EXOTFI GW1

 Latitude
 Longitude
 Northing
 Easting

 28° 09' 20.7"
 81° 06' 54.4"
 1389346
 619075

SectionTownshipRangeCountyQuad92732OsceolaHolopaw

Benchmark Information:

NameExisting / SetNAVD88NGVD29EXOTFISet70.9272.14

Reference Point Information:

Stamped Elevation (NGVD29) Stamped Date By Firm 75.39 10-17-07 Woolpert, Inc.

Note: Reference mark at edge of wood as marked.

Staff Gauge Information:

Water Elevation (NGVD29) Gauge Reading Time of Reading Date of Reading NA NA NA NA

To Reach Description:

From the intersection of US192 and US441, SE of the town of St. Cloud, proceed north west along US192 for 2.7 miles to the intersection with Cypress Creek Ranch Road. Proceed south along Cypress Creek Ranch Road for 0.3 miles to a driveway of an abandoned fish farm. The site is approximately 145 east of the centerline of the road.





Sensor Well:



Tag Close-up:



Bench Mark:



Bench Mark:



















Monitoring Well Field Data Sheet SFWMD #067411

Site/Station Designation: EXOTF]

Date: 10-17-07

Crew: U/M

Bench Mark Used:

Name stamp	Date stamp	EL NAVD 88	EL NGVD 29	Sign Present
EXOTF	2007	70.92	72,140	Yes

Level Setup:

STA	BS	HI	FS	NGVD29 EL	DIST & REM
EXOTEI	·			72.140	
	4.295	76,435			21.98
GW			1.043	75,392	26.57
	1,002	76.394			27.10
EXOTFI			4,253	7z, 141	

Tag Check List:

Photo Check List:

 Stamp Site/Station Designation Stamp Elevation in NGVD 29 Stamp Date Stamp By Woolport 	75, 392 Bench Ma 10-17-07 M. Well t	ark standing Photo# 100 -0 125 Photo# 100 -0 125
Stamp By WoolpertStamp Datum (NGVD 29)	M. Well s	tanding Photo# 100 -0 126
• Scratch Old Tag	/ M. Well A	Photo# 123 -0 127

Staff Gauge:

Site Name Water Elev.		Gauge Reading	Time Meas.	Date Meas.	
		^	_	. •	

Latitude and Longitude:

Editido and Longitude.		
2 8 09 20.7	41 01 744	\neg

Site Description, Comments, or Remarks:



Client: _____ Sheet: ____ of ____

Subject: EXOTFT ELEV RUN Order No.:

Computed by: U/M Date: ____ Date: ____ Date: ____ **WOOLPERT**

STA	B5+	HI	<u>F5-</u>	ELEV	D151		:
5 507	e e e e e e e e e e e e e e e e e e e			73.08			
	7.191	80.271			84,09		:
TPI			4.743	75.528	95.11		
	4.591	80.119		1	245.67		
1PZ			4.820	75,299	187.50		
	4,454	79.753			229.53		
TP3			5.102	74.651	203,21		
	5,259	79,91			222,01		
184			5.375	74.535	185.17		
	5.241	79.776			193,96		
175			5.715	74,061	192,13		
	5,043	79.104			198.56		
1P6			5.441	73,663	199,51		
	5,269	18.932			205.02		
TP7			4.576	74,356	181.82		
	5.068	79.424			144.06		
1P8			7.158	72,266	178,44		
	3.887	76,153			174,80		
TP9			5,096	71,057	197,93		
	5,276	76,333			188.02		
TPIO			5,286	71.045	184.94		
	5,257	76.302			188.78		3
TPII			5.448	70,854	157,15		
	5,243	76.097			136.12		
EXOTFI			5.176	70,921	144.78		
	5,081	76,002	· · · · · · · · · · · · · · · · · · ·		145.34		
TP12			5.298	70,704	166.17		
200	5,594	76,298			194.13		
TP 13	1	· · · · · · · · · · · · · · · · · · ·	5,169	71,129	197.93		
	5.215	76,344	- 71 6/		185.63		
TP14			5,252	71.092	220.64		
	5,830	76,922			245,67		: :
TP15			2,191	74,731	185.92	EXATFI OFZ	
1.1.1.1.				ut i videl (" 	10311	LAUIFI (OF &	
<u> </u>							



Client: __

Sheet: ______ of ____

Subject: EXOTFI ELEU RUN

____ Order No.: _____

Computed by: Ohecked by: Checked by:

Date:

STA	<u>B5+</u>	HI	<u>FS-</u>	FLEY	DIST	
	4,605	79,336			147.31	
TP 16			5,252	74.084	159.28	
	5.092	79.176			214.73	
TP17			5.364	73.812	188.39	
	4.970	78.782			206,76	
TP 18			5.158	73.624	198.52	
	4.980	78.604			200.52	
TP 19			5.301	73,303	200.89	
	5.308	78,611			200,20	
TP20			4.712	73.899	198,10	
	5.626	79,525		:	234.84	
1P21			5.165	74.36	182.28	8154.32
	5.092	79.452		**************************************	91.11	
R 507			8.798	70.654	71.65	TOTAL DIS - 1,54
			R 507 -	70.67		
				DELEV . C	1,016	

10/17/07 URZUA/MCLARINEY P/c 85°F



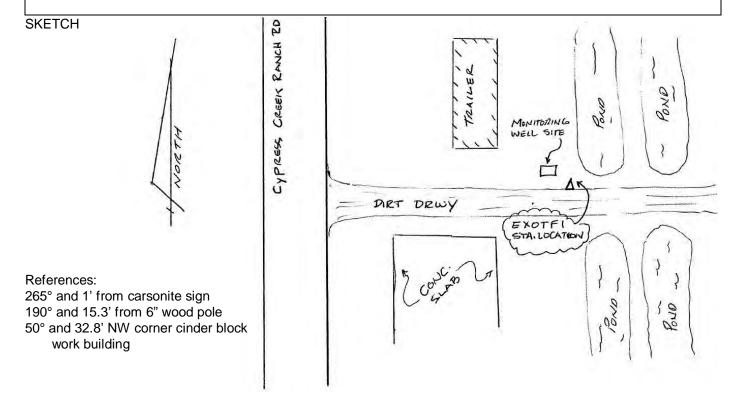
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 4/01

COUNTY	OSCEOLA	PROJECT VD Elevation Audit		DESIGNATION	EXOTFI						
SECTION	9	TOWNSHIP	27	RANGE	32						
GEOGRAPHIC INDEX OF QUAD 28081-B1											
Established by WOOLPERT NAME OF QUADRANGLE HOLOPAW											
SURVEYOR JOHN CESTNICK DATE 9 / 12 / 2007 FIELD BOOK W0104 PAGE											
HORIZONTAL DATUM: 1983 ZONE E											
VERTICAL DATUM	II : NGVD 1929	NVD 1988									
CONTROL ACCURACY: HORIZONTAL GPS RTD VERTICAL 3											
STATE PLANE CO	ORDINATES	X 619075	Y 1389346	EL. NGVD	29 72.14						
				NAVD	88 70.92						
LATITUDE 28° 09' 20.7" LONGITUDE 081° 06' 54.4"											
DESCRIPTION											

To Reach:

From the intersection of US192 and US441, SE of the town of St. Cloud, proceed north west along US192 for 2.7 miles to the intersection with Cypress Creek Ranch Road. Proceed south along Cypress Creek Ranch Road for 0.3 miles to a driveway of an abandoned fish farm. The site is approximately 145 east of the centerline of the road in front of monitoring well. The BM is a SFWMD disc on an 8" diameter & 40" deep concrete monument incased by a PVC pipe.



The NGS Data Sheet

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

```
DATABASE =
               ,PROGRAM = datasheet, VERSION = 7.60
         National Geodetic Survey, Retrieval Date = MAY 15, 2008
 AJT6678
 AJ6678 DESIGNATION - S 507
AJ6678 PID - AJ667
          PID - AJ6678
STATE/COUNTY- FL/OSCEOLA
 AJ6678
 AJ6678
          USGS QUAD - HOLOPAW (1970)
 AJ6678
 AJ6678
                                         *CURRENT SURVEY CONTROL
 AJ6678
 AJ6678
 AJ6678* NAD 83(1986) - 28 09 19.
                                                (N)
                                                        081 06 31.
                                                                            (W)
                                                                                      SCALED
 AJ6678* NAVD 88
                                      22.275
                                                                 73.08
                                                                           (feet)
                                                                                     ADJUSTED
                                               (meters)
 AJ6678
          GEOID HEIGHT-
 AJ6678
                                       -27.99
                                                (meters)
                                                                                      GEOID03
 AJ6678
          DYNAMIC HT -
                                        22.242 (meters)
                                                                   72.97
                                                                            (feet)
                                                                                     COMP
                                 979,156.1
 AJ6678
          MODELED GRAV-
                                                                                      NAVD 88
                                                 (mgal)
 AJ6678
          VERT ORDER - SECOND
                                          CLASS I
 AJ6678
 AJ6678
 AJ6678. The horizontal coordinates were scaled from a topographic map and have
 AJ6678.an estimated accuracy of +/- 6 seconds.
 AJ6678. The orthometric height was determined by differential leveling
 AJ6678.and adjusted in April 2004.
 AJ6678
 AJ6678. The geoid height was determined by GEOID03.
 AJ6678
AJ6678. The dynamic height is computed by dividing the NAVD 88 AJ6678. geopotential number by the normal gravity value computed on the AJ6678. Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 AJ6678.degrees latitude (g = 980.6199 \text{ gals.}).
 AJ6678
 AJ6678. The modeled gravity was interpolated from observed gravity values.
 AJ6678
                                                               Units Estimated Accuracy MT (+/- 180 meters Scaled)
 AJ6678;
                                                     East
                                   North
 AJ6678; SPC FL E
                                                 189,330.
                               423,420.
 AJ6678
 AJ6678
                                         SUPERSEDED SURVEY CONTROL
 AJ6678
 AJ6678.No superseded survey control is available for this station.
 AJ6678
 AJ6678_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RMM893144(NAD 83)
 AJ6678_MARKER: DD = SURVEY DISK
 AJ6678 SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AJ6678_STAMPING: S 507 2001
 AJ6678_MARK LOGO: FLDEP
 AJ6678 MAGNETIC: B = BAR MAGNET IMBEDDED IN MONUMENT
 AJ6678_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
 AJ6678+STABILITY: SURFACE MOTION
AJ6678_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AJ6678+SATELLITE: SATELLITE OBSERVATIONS - October 17, 2007
 AJ6678
 AJ6678
          HISTORY
                          - Date
                                        Condition
                                                              Report By
 AJ6678 HISTORY
                          - 2001
                                        MONUMENTED
                                                              FIDED
          HISTORY
                          - 20071017 GOOD
                                                              WOOLPT
 AJ6678
 AJ6678
 AJ6678
                                         STATION DESCRIPTION
 AJ6678
 AJ6678'DESCRIBED BY FL DEPT OF ENV PRO 2001 (JLM) AJ6678'THE MARK IS ABOUT 14.0 MI (22.5 KM) EAST OF ST CLOUD, 2.2 MI (3.5 KM)
 AJ6678'NORTHWEST OF HOLOPAW, IN SECTION 10, TOWNSHIP 27 SOUTH, RANGE 32 EAST.
 AJ6678'TO REACH THE MARK FROM THE JUNCTION OF U.S. HIGHWAY 441 (HOLOPAW AJ6678'ROAD) AND U.S. HIGHWAY 192 (EAST BRONSON HIGHWAY, STATE ROAD 15,
AJ6678'COUNTY ROAD 500) IN HOLOPAW, GO WEST ON U.S. HIGHWAY 192, 441 (EAST AJ6678'BRONSON HIGHWAY, STATE ROAD 15, COUNTY ROAD 500) FOR 2.15 MI (3.46 KM) AJ6678'TO THE JUNCTION OF A DIRT ROAD ON THE RIGHT AND THE MARK ON THE RIGHT, AJ6678'SET IN THE TOP OF A ROUND CONCRETE MONUMENT FLUSH WITH THE GROUND AND
 AJ6678'LEVEL WITH U.S. HIGHWAY 192. LOCATED 52.0 FT (15.8 M) NORTHEAST OF
 AJ6678'THE CENTERLINE OF U.S. HIGHWAY 192, 38.9 FT (11.9 M) WEST-SOUTHWEST
```

Elapsed Time = 00:00:01

```
AJ6678'OF THE CENTER OF A METAL GATE, 15.0 FT (4.6 M) NORTHWEST OF THE AJ6678'APPROXIMATE CENTERLINE OF A DIRT ROAD, 4.0 FT (1.2 M) NORTHEAST OF THE AJ6678'SOUTHEAST CORNER OF A BARBWIRE FENCE AND 1.0 FT (0.3 M) SOUTHEAST OF A AJ6678'BARBWIRE FENCE AND CARSONITE WITNESS POST. NOTE A BAR MAGNET WAS AJ6678'IMBEDDED IN THE MONUMENT ON THE SOUTH SIDE.
AJ6678
AJ6678
AJ6678
AJ6678
AJ6678
AJ6678
AJ6678
AJ6678'RECOVERY NOTE BY WOOLPERT CONSULTANTS 2007 (NM)
AJ6678'RECOVERED IN GOOD CONDITION.
```

The NGS Data Sheet

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

```
DATABASE =
                 ,PROGRAM = datasheet, VERSION = 7.60
          National Geodetic Survey, Retrieval Date = MAY 15, 2008
 AJ6677 DESIGNATION - R 507
AJ6677 PID - AJ6677
AJ6677 STATE/COUNTY- FL/OSCEOLA
 AJ6677
           USGS QUAD - HOLOPAW (1970)
 AJ6677
 AJ6677
                                             *CURRENT SURVEY CONTROL
 AJ6677
 AJ6677
                                                               081 07 15.
 AJ6677* NAD 83(1986) - 28 09 52.
                                                     (N)
                                                                                    (W)
                                                                                                SCALED
 AJ6677* NAVD 88
                                          21.541
                                                    (meters)
                                                                         70.67
                                                                                    (feet)
                                                                                               ADJUSTED
 AJ6677
                                                                                                GEOID03
            GEOID HEIGHT-
 AJ6677
                                           -27.99
                                                      (meters)
                                             21.509 (meters)
 AJ6677
            DYNAMIC HT -
                                                                          70.57
                                                                                    (feet)
                                                                                               COMP
                                     979,156.4
 AJ6677
            MODELED GRAV-
                                                                                               NAVD 88
                                                       (mgal)
 AJ6677
            VERT ORDER - SECOND
                                               CLASS I
 AJ6677
 AJ6677
 AJ6677. The horizontal coordinates were scaled from a topographic map and have
 AJ6677.an estimated accuracy of +/- 6 seconds.
 AJ6677. The orthometric height was determined by differential leveling
 AJ6677.and adjusted in April 2004.
 AJ6677
 AJ6677. The geoid height was determined by GEOID03.
 AJ6677. The dynamic height is computed by dividing the NAVD 88 AJ6677. geopotential number by the normal gravity value computed on the AJ6677. Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 AJ6677.degrees latitude (g = 980.6199 \text{ gals.}).
 AJ6677
 AJ6677. The modeled gravity was interpolated from observed gravity values.
 AJ6677
                                                                      Units Estimated Accuracy MT (+/- 180 meters Scaled)
 AJ6677;
                                       North
                                                           East
 AJ6677; SPC FL E
                                                       188,130.
                                   424,440.
 AJ6677
 AJ6677
                                              SUPERSEDED SURVEY CONTROL
 AJ6677
 AJ6677.No superseded survey control is available for this station.
 AJ6677
 AJ6677\_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RMM881154(NAD 83) AJ6677_MARKER: F = FLANGE-ENCASED ROD
 AJ6677_SETTING: 49 = STAINLESS STEEL ROD W/O SLEEVE (10 FT.+)
 AJ6677_STAMPING: R 507 2001
AJ6677_MARK LOGO: NGS
AJ6677_PROJECTION: FLUSH
 AJ6677_MAGNETIC: M = MARKER EQUIPPED WITH BAR MAGNET
 AJ6677_STABILITY: B = PROBABLY HOLD POSITION/ELEVATION WELL AJ6677_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AJ6677+SATELLITE: SATELLITE OBSERVATIONS - October 17, 2007
 AJ6677_ROD/PIPE-DEPTH: 18.3 meters
 AJ6677
 AJ6677
           HISTORY
                            - Date
                                             Condition
                                                                    Report By
          HISTORY
                            - 2001
 AJ6677
                                            MONUMENTED
                                                                     FLDED
 AJ6677
           HISTORY
                             - 20071017 GOOD
                                                                     WOOLPT
 AJ6677
                                              STATION DESCRIPTION
 AJ6677
 AJ6677
 AJ6677'DESCRIBED BY FL DEPT OF ENV PRO 2001 (JLM)
 AJ6677'THE MARK IS ABOUT 13.0 MI (20.9 KM) EAST OF ST CLOUD, 3.3 MI (5.3 KM) AJ6677'NORTHWEST OF HOLOPAW, IN SECTION 4, TOWNSHIP 27 SOUTH, RANGE 32 EAST. AJ6677'TO REACH THE MARK FROM THE JUNCTION OF U.S. HIGHWAY 441 (HOLOPAW AJ6677'ROAD) AND U.S. HIGHWAY 192 (EAST BRONSON HIGHWAY, STATE ROAD 15,
 AJ6677'COUNTY ROAD 500) IN HOLOPAW, GO WEST ON U.S. HIGHWAY 192, 441 (EAST AJ6677'BRONSON HIGHWAY, STATE ROAD 15, COUNTY ROAD 500) FOR 3.15 MI (5.07 KM) AJ6677'TO THE MARK ON THE RIGHT, A STAINLESS STEEL ROD DRIVEN TO REFUSAL AT A AJ6677'DEPTH OF 60.2 FT (18.3 M) WITH A ROSS LOGO CAP FLUSH WITH THE GROUND
 AJ6677'AND LEVEL WITH U.S. HIGHWAY 192, THE DATUM POINT IS RECESSED 0.6 FT
```

AJ6677'(18.3 CM) BELOW THE LEVEL OF THE NGS LOGO CAP. LOCATED 132.7 FT (40.4 AJ6677'M) SOUTHEAST OF THE SOUTHEAST END OF A BOX CULVERT UNDER U.S. HIGHWAY AJ6677'192, 54.0 FT (16.5 M) SOUTHEAST OF THE SOUTHEAST END OF METAL AJ6677'GUARDRAIL, 44.0 FT (13.4 M) SOUTHEAST OF A ROUND CONCRETE POWER POLE, AJ6677'32.2 FT (9.8 M) NORTHEAST OF THE CENTERLINE OF U.S. HIGHWAY 192 AND AJ6677'1.0 FT (0.3 M) SOUTHWEST OF BARBWIRE FENCE AND CARSONITE WITNESS POST. AJ6677'NOTE A BAR MAGNET WAS IMBEDDED IN MONUMENT ON THE SOUTH SIDE. NOTE AJ6677 ACCESS TO THE DATUM POINT IS HAD THROUGH A 5-INCH NGS LOGO CAP. AJ6677

STATION RECOVERY (2007)

AJ6677'RECOVERY NOTE BY WOOLPERT CONSULTANTS 2007 (NM) AJ6677'RECOVERED IN GOOD CONDITION.

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

Section 3: Monitoring Well Site Information in Table Format

Monitoring Well Site Information in Table Format

Well	Well								Latitude	Longitude	Ref. Point Elev.	Ref. Point Elev.	Benchmark Name	Benchmark	Benchmark
Designation	Type	County	Quadrangle	Section	Township	Range	Northing	Easting	of BM	of BM	(NGVD29)	(NAVD88)	Used to Set Ref.	Elev.	Elev.
													Elev.	(NGVD29)	(NAVD88)
AIR19	GW1	Orange	Pine Castle	18	24	30	1479505	542444	28 24 11.94	81 21 13.49	89.41	88.48	AIR19	84.80	83.87
AIR19	GW2	Orange	Pine Castle	18	24	30	1479505	542444	28 24 11.94	81 21 13.49	90.05	89.12	AIR19	84.80	83.87
ALL1	GW1	Osceola	Ashton	29	26	31	1404991	577718	28 11 55	81 14 36.8	76.52	75.59	ALLIGATOR WELL #2	71.77	70.85
ALL1	GW2	Osceola	Ashton	29	26	31	1404991	577718	28 11 55	81 14 36.8	76.27	75.35	ALLIGATOR WELL #2	71.77	70.85
ALL2 ALL2	GW1 GW2	Osceola	Ashton Ashton	29 29	26 26	31	1404988 1404988	578899 578899	28 11 55 28 11 55	81 14 23.6 81 14 23.6	74.16	73.24	ALLIGATOR WELL #2 ALLIGATOR WELL #2	71.77 71.77	70.85 70.85
BOG527	STG1	Osceola Orange	Lake Jessamine	13	24	31 29	1475481	535428	28 23 31.94	81 22 31.9	73.80 87.50	72.88 86.58	BOG 527	81.88	70.85 80.95
C31SW	STG1	Osceola	St Cloud South	8	26	30	1418598	547434	28 14 09.02	81 20 15.7	62.77	61.83	C31 GFS	57.70	56.76
CAST	GW1	Osceola	Ashton	5	27	32	1395463	612548	28 10 21.4	81 08 07.4	74.54	73.34	CAST	71.85	70.65
CAST	GW2	Osceola	Ashton	5	27	32	1395463	612548	28 10 21.4	81 08 07.4	74.07	72.87	CAST	71.85	70.65
EXOTFI	GW1	Osceola	Holopaw	9	27	32	1389346	619075	28 09 20.7	81 06 54.4	75.39	74.17	EXOTFI	72.14	70.92
INRCTY	GW1	Osceola	Intercession City	3	26	28	1426088	493978	28 15 21.34	81 30 13.70	71.17	70.21	OSFWELLS BM1	68.47	67.51
INRCTY	GW2	Osceola	Intercession City	3	26	28	1426088	493978	28 15 21.34	81 30 13.70	71.14	70.18	OSFWELLS BM1	68.47	67.51
INRCTY	GW3	Osceola	Intercession City	3	26	28	1426088	493978	28 15 21.34	81 30 13.70	71.98	71.02	OSFWELLS BM1	68.47	67.51
INRCTY	GW4	Osceola	Intercession City	3	26	28	1426088	493978	28 15 21.34	81 30 13.70	72.53	71.57	OSFWELLS BM1	68.47	67.51
INRCTY	GW5	Osceola	Intercession City	3	26	28	1426088	493978	28 15 21.34	81 30 13.70	72.10	71.14	OSFWELLS BM1	68.47	67.51
INRCTY	GW6	Osceola	Intercession City	3	26	28	1426088	493978	28 15 21.34	81 30 13.70	71.23	70.27	OSFWELLS BM1	68.47	67.51
KIRCOF	GW1	Osceola	Lake Tohopekaliga	9	27	29	1389279	519428	28 09 17.84	81 25 27.67	74.83	73.82	OS 134	71.66	70.65
KIRCOF	GW2	Osceola	Lake Tohopekaliga	9	27	29	1389279	519428	28 09 17.84	81 25 27.67	73.93	72.92	OS 134	71.66	70.65
KISSD	STG1	Osceola	Kissimmee	28	25	29	1436371	521494	28 17 04.2	81 25 06.4	65.19	64.25	KISSD	61.42	60.48
MAKO	GW1	Osceola	Narcoossee	32	25	31	1432570	582808	28 16 28.18	81 13 40.49	80.19		MAKO 3	76.39	L
MOSSPK	GW1	Orange	Narcoossee NW	23	24	31	1470369	594673	28 22 42.65	81 11 28.46	72.64	71.60	MOSSPK	68.53	67.49
MOSSPK	GW2	Orange	Narcoossee NW	23	24	31	1470369	594673	28 22 42.65	81 11 28.46	72.30	71.26	MOSSPK	68.53	67.49
OAKISL	GW1	Osceola	Lake Louisa SW	5 5	25 25	27	1454680	452311	28 20 02.49	81 38 01.31	111.46	110.60	OAKISL	109.10	108.24 108.24
OAKISL OAKISL	GW2 GW3	Osceola Osceola	Lake Louisa SW Lake Louisa SW	5	25	27 27	1454680 1454680	452311 452311	28 20 02.49 28 20 02.49	81 38 01.31 81 38 01.31	111.60 111.55	110.74 110.69	OAKISL OAKISL	109.10 109.10	108.24
OAKISL	GW4	Osceola	Lake Louisa SW	5	25	27	1454680	452311	28 20 02.49	81 38 01.31	110.01	109.15	OAKISL	109.10	108.24
OSF53	GW1	Osceola	St Cloud South	18	27	30	1383756	542986	28 08 23.9	81 21 04.3	62.77	61.73	OSF 53	61.41	60.37
OSF53	GW1	Osceola	St Cloud South	18	27	30	1383756	542986	28 08 23.9	81 21 04.3	63.68	62.63	OSF 53	61.41	60.37
OSF53	GW3	Osceola	St Cloud South	18	27	30	1383756	542986	28 08 23.9	81 21 04.3	63.69	62.65	OSF 53	61.41	60.37
REDYCK	GW1	Orange	Intercession City	23	24	27	1470874	467168	28 22 43.57	81 35 15.94	101.54	100.60	REDYCK	99.09	98.15
REDYCK	GW2	Orange	Intercession City	23	24	27	1470874	467168	28 22 43.57	81 35 15.94	103.64	102.70	REDYCK	99.09	98.15
S57-SCA	STG1	Osceola	Narcoossee	1	25	31	1455933	600071	28 20 19.8	81 10 27.79	71.38	70.33	Y 577	68.78	67.73
S57-SCA	STG2	Osceola	Narcoossee	1	25	31	1455933	600071	28 20 19.8	81 10 27.79	71.37	70.32	Y 577	68.78	67.73
S58-SCA	STG1	Osceola	Narcoossee	36	25	31	1431567	604364	28 16 18.59	81 09 39.38	72.40	71.35	OS 100	70.17	69.12
S58-SCA	STG2	Osceola	Narcoossee	36	25	31	1431567	604364	28 16 18.59	81 09 39.38	72.41	71.36	OS 100	70.17	69.12
S59-SCA	HW	Osceola	St Cloud North	33	25	30	1429037	555707	28 15 52.6	81 18 43.5	66.83	65.83	KR 908	61.69	60.69
S59-SCA	TW	Osceola	St Cloud North	33	25	30	1429037	555707	28 15 52.6	81 18 43.5	66.80	65.81	KR 908	61.69	60.69
S59W	GW1	Osceola	St Cloud North	33	25	30	1429076	555692	28 15 52.99	81 18 43.67	62.52	61.63	OS 81 1980	65.02	64.13
S60-SCA	HW	Osceola	Ashton	32	26	31	1397057	580727	28 10 36.5	81 14 03	75.57	74.48	KR 1066	71.01	70.14
S60-SCA	TW	Osceola	Ashton	32	26	31	1397057	580727	28 10 36.5	81 14 03	74.58	73.49	KR 1066	71.01	70.14
S61-SCA	HW	Osceola	St Cloud South	18	27	30	1383797	542852	28 08 24.3	81 21 05.8	65.58	64.54	OSF 53	61.40	60.37
S61-SCA	TW	Osceola	St Cloud South	18	27	30	1382797	542852	28 08 24.3	81 21 05.8	65.56	64.53	OSF 53	61.40	60.37
S62-SCA	HW	Orange	Narcoossee	33	24	31	1464776	586085	28 21 47.13	81 13 04.49	72.51	71.48	OR 91	68.60	67.57
S62-SCA	TW	Orange	Narcoossee	33 19	24 27	31 31	1464776 1376003	586085 574258	28 21 47.13 28 07 07.9	81 13 04.49 81 15 14.8	72.53 71.75	71.50 70.85	OR 91 KR 1067	68.60 68.33	67.57 67.43
S63-SCA S63-SCA	TW	Osceola Osceola	Cypress Lake Cypress Lake	19	27	31	1376003	574258	28 07 07.9	81 15 14.8	71.78	70.88	KR 1067 KR 1067	68.33	67.43
SCBR	GW1	Orange	Lake Jessamine	8	24	29	1478382	516853	28 24 36.17	81 26 01.71	86.28	85.37	C 1286 036	87.57	86.66
SCPE	GW1	Orange	Kissimmee	29	24	29	1468791	514892	28 22 24.96	81 26 21.57	81.44	80.53	SCPE	78.19	77.28
SCPN	HW	Orange	Lake Jessamine	19	24	29	1474814	510500	28 23 24.27	81 27 11.51	83.15	82.24	SCPN	78.53	77.62
SCPN	TW	Orange	Lake Jessamine	19	24	29	1474814	510500	28 23 24.27	81 27 11.51	83.04	82.13	SCPN	78.53	77.62
SCPS	HW	Orange	Kissimmee	30	24	29	1468563	510520	28 22 22.55	81 27 10.50	82.64	81.73	L 715 008	79.23	78.32
SCPS	TW	Orange	Kissimmee	30	24	29	1468563	510520	28 22 22.55	81 27 10.50	82.47	81.56	L 715 008	79.23	78.32
SCSS	STG1	Orange	Lake Jessamine	13	24	28	1477281	508089	28 23 48.78	81 27 38.09	85.09	84.20	SCSS	80.72	79.83
SW15	GW1	Orange	Lake Louisa SW	16	24	27	1475682	456994	28 23 30.67	81 37 10.11	111.05	110.11	SW15-9	108.93	107.99
SW15	GW2	Orange	Lake Louisa SW	16	24	27	1475682	456994	28 23 30.67	81 37 10.11	112.34	111.40	SW15-9	108.93	107.99
TOHO 1	GW1	Osceola	St Cloud South	33	26	30	1396053	555533	28 10 26	81 18 44.5	68.01		TOHO 1	64.46	
TOHO 1	GW2	Osceola	St Cloud South	33	26	30	1396053	555533	28 10 26	81 18 44.5	67.81		TOHO 1	64.46	
TOHO 2	GW1	Osceola	St Cloud South	3	27	30	1395292	557196	28 10 18.5	81 18 25.9	69.40	68.37	TOHO 2	65.66	64.63

Monitoring Well Site Information in Table Format

Well Designation	Well Type	County	Quadrangle	Section	Township	Range	Northing	Easting	Latitude of BM	Longitude of BM	Ref. Point Elev. (NGVD29)	Ref. Point Elev. (NAVD88)	Benchmark Name Used to Set Ref. Elev.	Benchmark Elev. (NGVD29)	Benchmark Elev. (NAVD88)
TOHO 4	GW1	Osceola	Lake Tohopekaliga	10	27	29	1386180	530170	28 08 47.51	81 23 27.55	63.71	62.68	TOHO 4	59.62	58.59
TOHO 5	GW1	Osceola	Lake Tohopekaliga	29	26	29	1405464	514584	28 11 57.92	81 26 22.44	74.36	73.38	TOHO 5	70.33	69.35
TOHO 5	GW2	Osceola	Lake Tohopekaliga	29	26	29	1405464	514584	28 11 57.92	81 26 22.44	74.10	73.12	TOHO 5	70.33	69.35
TOHO 6	GW1	Osceola	St Cloud South	29	26	29	1403532	540917	28 11 39.66	81 21 28.06	70.44	69.45	TOHO 6	67.01	66.02
TOHO 7	GW1	Osceola	Kissimmee	21	25	29	1440606	519669	28 17 46.06	81 25 26.98	74.21	73.25	BMWELL 7	70.84	69.88
TOHO 8	GW1	Osceola	Kissimmee	21	25	29	1440342	523931	28 17 43.6	81 24 39.3	68.95	67.99	BMWELL 8	65.40	64.44
TOHO 10	GW1	Osceola	St Cloud South	19	26	30	1406499	543294	28 12 09.1	81 21 01.6	74.67	73.67	TOHO 10	70.58	69.58
TOHO 12	GW1	Osceola	St Cloud North	10	25	30	1453807	561663	28 19 58.01	81 17 37.57	77.82	76.62	BMWELL12	73.92	72.72
TOHO 14	GW1	Osceola	St Cloud South	13	27	30	1385263	569855	28 08 39.5	81 16 04.2	72.84		WELL 14	69.09	
TOHO 15	GW1	Osceola	St Cloud South	30	26	31	1401062	572717	28 11 16	81 15 32.6	78.40	77.38	TOHO 15	75.05	74.02
TOHO 16	GW1	Osceola	St Cloud South	1	27	30	1393537	568710	28 10 01.4	81 16 17.2	72.77	71.73	TOHO 16A	69.12	68.08
TOHO 16	GW2	Osceola	St Cloud South	1	27	30	1393537	568710	28 10 01.4	81 16 17.2	72.60	71.56	TOHO 16A	69.12	68.08
TOHO E	STG1	Osceola	St Cloud North	2	26	30	1427170	565475	28 15 34.35	81 16 54.22	61.93	60.94	TOHOE	61.63	60.64
TOHO W	STG1	Osceola	Kissimmee	32	25	29	1438045	525426	28 17 20.9	81 24 22.49	62.07	61.13	TOHOW	57.93	56.98
WR6	GW1	Osceola	Lake Hatchineha	28	27	29	1374487	523000	28 06 51.5	81 24 47.2	69.05	68.01	WR 6	64.82	63.78
WR8	GW1	Osceola	Lake Hatchineha	28	27	29	13711644	521486	28 06 23.3	81 25 04.0	72.89	71.85	WR 8	70.83	69.79
WR9	GW1	Osceola	Lake Hatchineha	28	27	29	1372605	520934	28 06 32.8	81 25 10.2	70.65	69.61	WR 9	70.36	69.32

NOTES:

- 1. Latitude and longitude were derived at the benchmark location, and is given to assist in locating the site. It is not meant to accurately locate each well.
- 2. Northing and Eastings were obtained by using CORPSCON to convert the latitude and longitude to Florida State Plane Coordinates, East Zone, Adjustment of 1990 (NAD83/90) HARN.
- All measurements and elevations are in feet unless otherwise noted.
- 4. Some Benchmarks used did not have a published NAVD88 elevation, and therefore have been left blank.
- 5. In a few cases a Benchmark did not have superseded NGVD29 values so CORPSCON was used to derive a NGVD29 elevation.

Section 4: Benchmark Data Sheets