Specific Purpose Survey of the Monitoring Wells TOHO 16

Osceola County, Florida

South Florida Water Management District's Purchase Order number PC P602220

Keith and Schnars project number 16434.07, Task 22002

> Report Date: August 15, 2006 Submittal: First

> > **Prepared for:**

South Florida Water Management District

Prepared by:



2525 Drane Field Road Suite #7 Lakeland, FL 33811 Ph. (863) 646-4771 Fax (863) 464-3378 Licensed Business (L.B.) 1337

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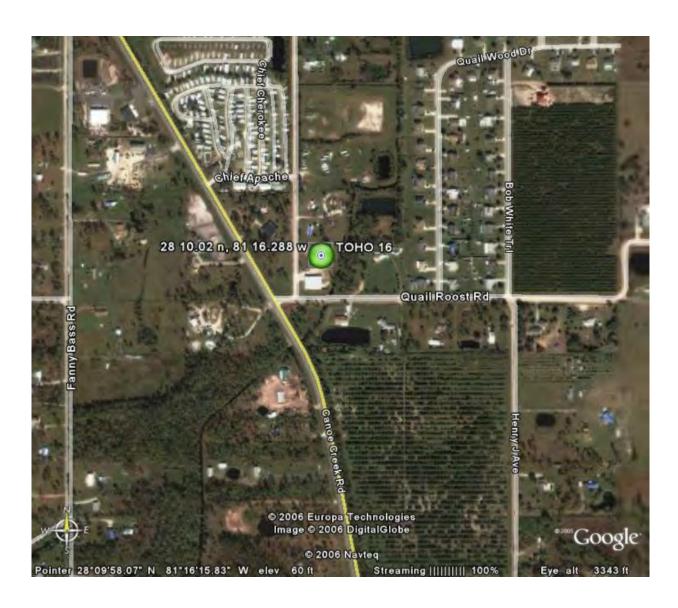
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PURPOSE

To establish vertical data (NAVD 1988 and NGVD 1929) on the Stilling Wells at the structure.

LOCATION OF PROJECT

The project is located in Osceola County.



ITEMS DELIVERED TO THE DISTRICT

- 1. Electronic copy of field notes.
- 2. Electronic copy of all computation sheets.
- 3. CORPSMET 95 file.
- 4. Site photographs.
- 5. Surveyor's Report.

DATUM FOR THE PROJECT

The vertical datum for the project is North American Datum of 1988 (NAVD '88). National Geodetic Survey vertical control monuments with published NAVD '88 elevations were used as the basis for this survey. The National Geodetic Vertical Datum of 1929 (NGVD '29) shown were computed using CORPSCON version 6.0 program.

LEVELING METHODS

Benchmark TOHO-16A was constructed at the site. The elevations were established from Benchmark R 506 with a Wild NA-2 conventional level and three-wire observation method.

VERTICAL CONTROL

BM R 506	Elevation:	NAVD 1988	70.41'	NGVD 1929	
Found in National Geodetic Survey Database	Latitude	28°09'20" (Scaled)			
State/County FL/Osceola	Longitude	81°16'09" (Scaled)			
USGS QUAD St. Cloud South (1980)					
Horiz. Order (Preliminary)					



(Preliminary)

Class

DESCRIBED BY FL DEPT OF ENV PRO 2001 (JLM) THE MARK IS ABOUT 24.8 MI (39.9 KM) NORTH OF KENSVILLE, 6.6 MI (10.6 KM) SOUTH OF ST. CLOUD, IN SECTION 12, TOWNSHIP 27 SOUTH, RANGE 30 EAST. TO REACH THE MARK FROM THE JUNCTION OF U.S. HIGHWAYS 192, 441 (13TH STREET) AND COUNTY ROAD 523 (VERMONT AVENUE, CANOE CREEK ROAD) IN ST. CLOUD, GO SOUTH ON COUNTY ROAD 523 (VERMONT AVENUE, CANOE CREEK ROAD) FOR 6.6 MI (10.6 KM) TO THE MARK ON THE LEFT, SET IN THE TOP OF A ROUND CONCRETE MONUMENT FLUSH WITH THE GROUND AND LEVEL WITH COUNTY ROAD 523. LOCATED 51.0 FT (15.5 M) SOUTH OF A DRIVEWAY AT 4465, 46.1 FT (14.1 M) EAST OF THE CENTERLINE OF COUNTY ROAD 523, 6.3 FT (1.9 M) SOUTH OF POWER POLE NUMBER 6-97534 (143524049006) WITH 3 GUY WIRES AND A TRANSFORMER ATTACHED AND 2.0 FT (0.6 M) WEST OF A CARSONITE WITNESS POST.

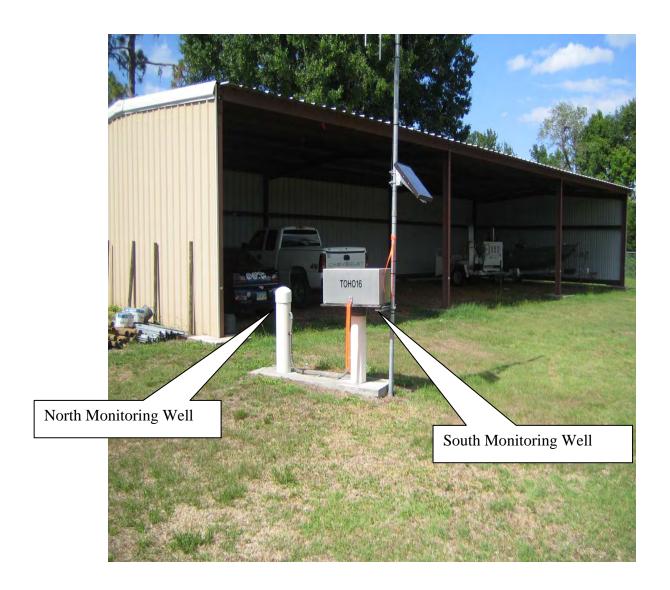
NOTE A BAR MAGNET WAS IMBEDDED IN THE MONUMENT ON THE SOUTH SIDE, 0.2 FT (6.1 CM) BELOW THE TOP OF THE MONUMENT.

PROJECT RESULTS

Monitoring Well #1 (South)	Monitoring Well #2 (North)
Monitoring Well TOHO 16: Reference mark: Set mark on W. side PVC pipe With initials K&S.	Monitoring Well TOHO 16: Reference mark: Set mark on S.E. side PVC pipe With initials K&S.
New Reference Mark El. <u>72.770'</u> (NGVD '29) (<u>Wrote -1.040' to NAVD 1988</u>).	New Reference Mark El. <u>72.607'</u> (NGVD '29) (<u>Wrote -1.040' to NAVD 1988</u>).
Initials: <u>K&S</u> B.M., R.F., R.C.	Initials: <u>K&S</u> B.M., R.F., R.C.
Date: 7/27/06	Date: 7/27/06
written at the mark:	written at the mark:
El. <u>ILLEGIBLE</u> Date: <u>0-00</u> By: <u>None</u>	El. <u>ILLEGIBLE</u> Date: <u>0-00</u> By: <u>None</u>
Reference Mark location:	Reference Mark location:
Top of PVC Pipe	Top of PVC Pipe

PROJECT PHOTO

TOHO-16



PROJECT PHOTO

TOHO-16

South Monitoring Well



PROJECT PHOTO

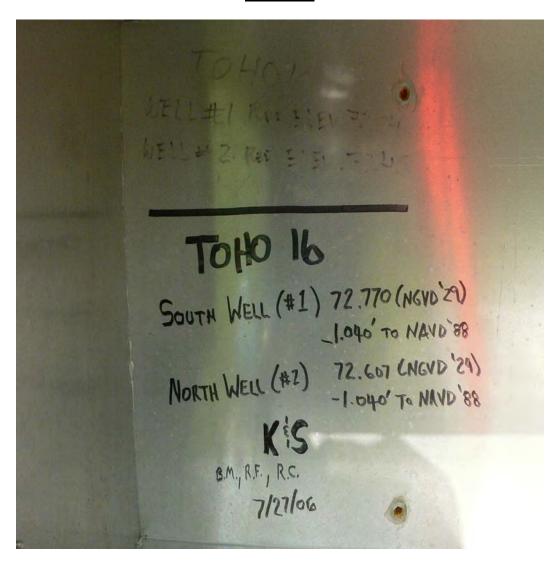
TOHO-16

North Monitoring Well



PROJECT PHOTO

TOHO-16



PROJECT PHOTO

TOHO-16





Comments:

Party Chief: D. Sullivan Field Book: 1156 Page 39-43

Bench Mark: "<u>R 506"</u> El. <u>70.41</u>" Vertical Datum: <u>NAVD1988</u>

Offset: 1.050' SFWMD VALUE (add this value to convert to NGVD 1929)
Offset: 1.050' NGS VALUE (add this value to convert to NGVD 1929)

NAVD 88 - North American Vertical Datum of 1988 NGVD29 -National Geodetic Vertical Datum of 1929 NAD 83-99 (Horizontal Datum) North American Datum

NGS- National Geodetic Survey

SFWMD- South Florida Water Management District

PVC-Polyvinyl Chloride

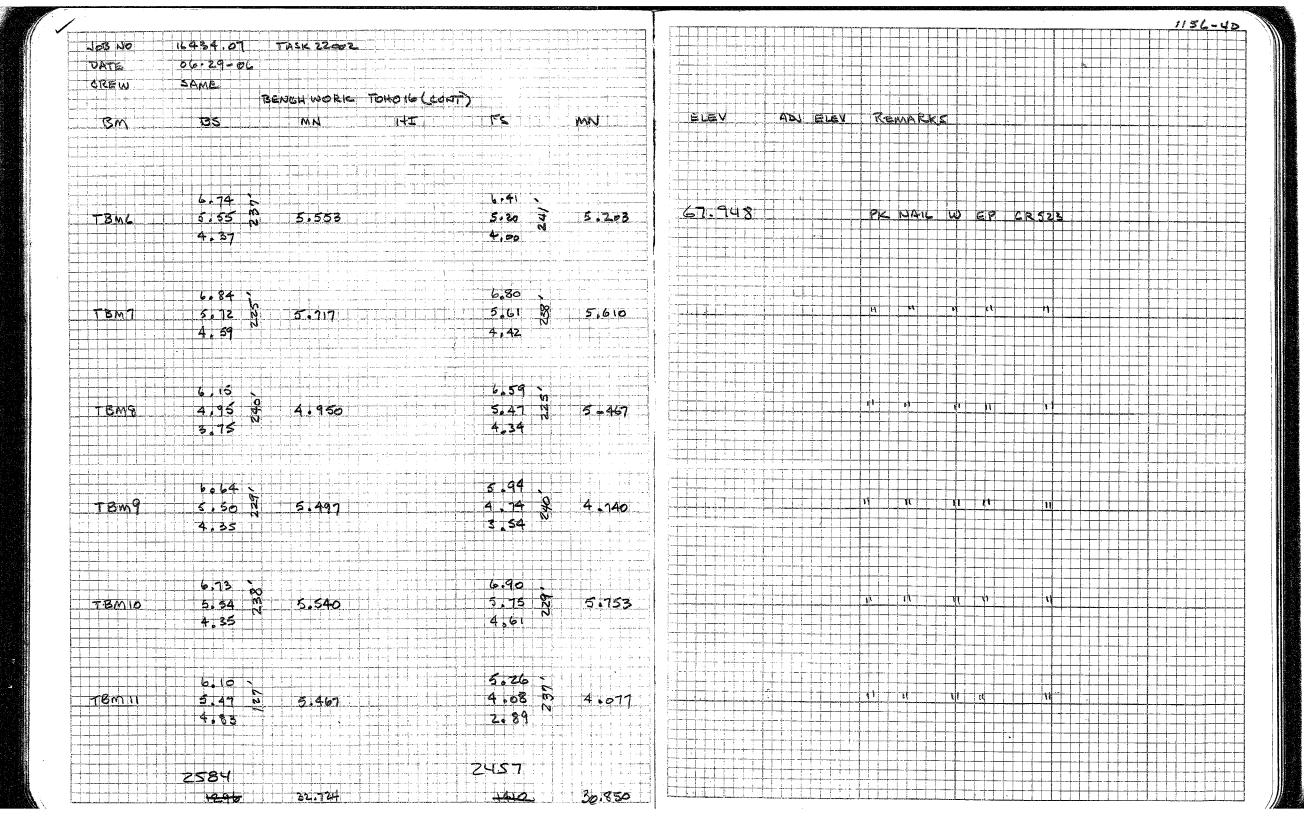
SURVEYOR'S CERTIFICATION

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 61-G17, Florida Administrative Code. This report is prepared for the sole and specific use of the South Florida Water Management District and is not assignable.

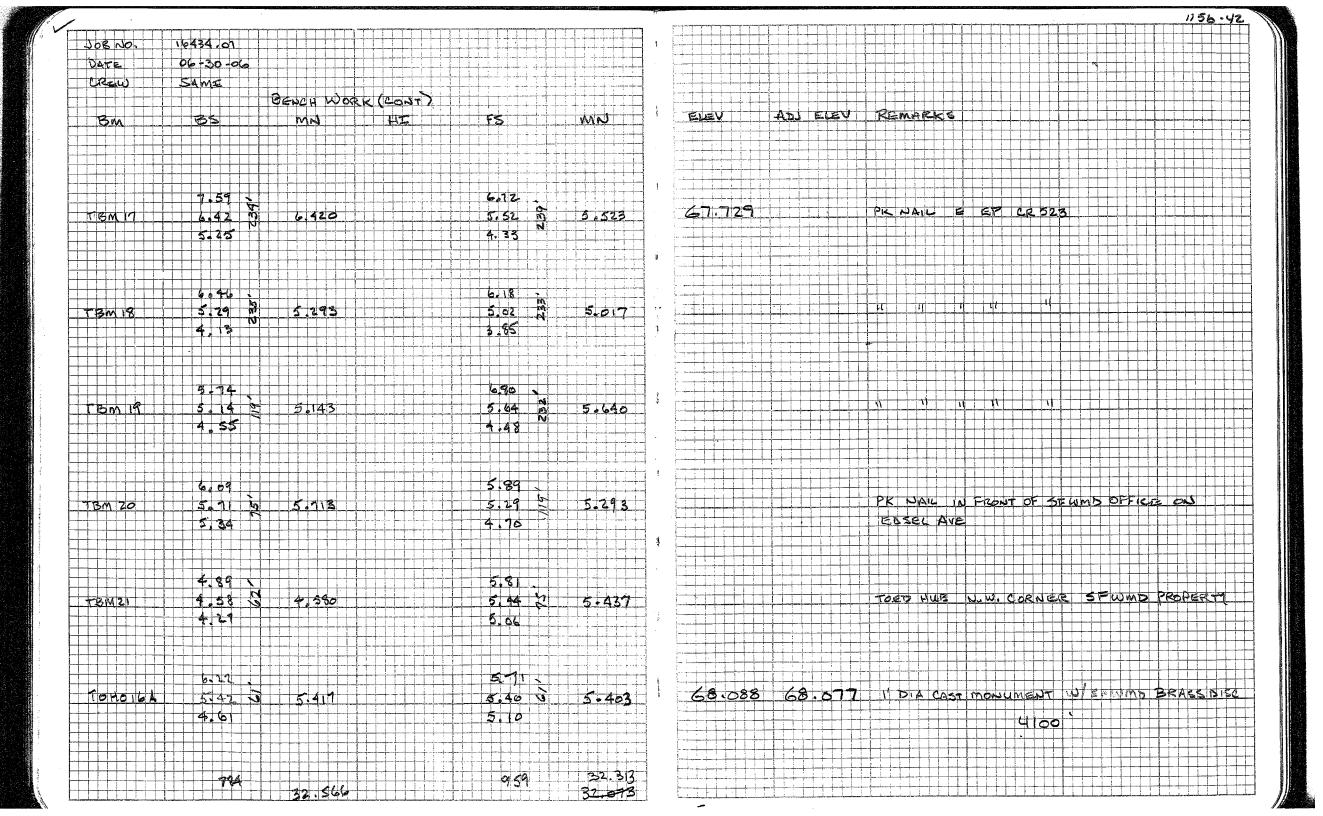
KEITH and SCHNARS, PA. L.B. number 1337

	2.2
	By:
Date of Survey	Kenneth T. Glass, PSM
July 27, 2006	Professional Surveyor and Mapper
•	State of Florida
	Certificate No. 5713

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TOHO 16. met

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Identification_Information:
          Ci tati on:
                    Ci tati on_I nformati on:
                               Originator: Kenneth T. Glass, P.S.M. (ed.)
Publication_Date: 20060727
Publication_Time: Unknown
Title: S.F.W.M.D. Monitoring Well
                               Edition: TOHO-16
                               Publication_Information:
                                         Publication_Place: Not Published
                                         Publisher: None
                               Online_Linkage: kglass@keithandschnars.com
          Description:
                    Abstract:
                               South Florida Water Management District
                               Structure TOHO-16
                    Purpose:
                               To establish reference elevations in NAVD 1988 and
                               NGVD 1929 datum at the Monitoring Well(s).
          Time_Period_of_Content:
                    Time_Peri od_Information:
                               Si ngl e_Date/Ti me:
                    Cal endar_Date: 20060727
Currentness_Reference: Publication Date
          Status:
                    Progress: Complete
                    Maintenance_and_Update_Frequency: Unknown
          Spati al _Domai n:
                    Boundi ng_Coordi nates:
                               West_Boundi ng_Coordi nate: 81°16'17.3"
East_Boundi ng_Coordi nate: 81°16'17.3"
North_Boundi ng_Coordi nate: 28°10'01.2"
South_Boundi ng_Coordi nate: 28°10'01.2"
          Keywords:
                     Theme:
                               Theme_Keyword_Thesaurus: Specific Purpose Survey
                               Theme_Keyword: Monitoring Well(s)
                    PI ace:
                               Place_Keyword_Thesaurus: Osceola County
Place_Keyword: S.F.W.M.D. Monitoring Well TOHO-16
Place_Keyword: SEC. 01 - T27S - R30E
          Access_Constraints: Key needed to gain access to Monitoring Wells.
          Use_Constraints: Call South Florida Water Management District for key.
          Point_of_Contact:
                    Contact_Information:
                               Contact_Person_Pri mary:
                                         Contact_Person: Howard J. Ehmke
                                         Contact_Organization: South Florida Water Management
District
                               Contact_Position: P.S.M.
                               Contact_Address:
                                         Address_Type: mailing and physical address
                                         Address:
                                                    Acceler 8
                                                    Suite 150
                                                    2301 Centerpark West Drive
                                         City: West Palm Beach
State_or_Province: Florida
Postal_Code: 33409
                                         Country: USA
                               Contact_Voi ce_Tel ephone: (561) 242-5520 ext 4064
                               Contact_Electronic_Mail_Address: hehmke@sfwmd.gov
                               Hours_of_Service: 8:00 am to 5:00 pm EST
                                                  Page 1
```

TOHO 16. met

Data_Quality_Information:

```
Attribute_Accuracy:
Attribute_Accuracy:
Attribute_Accuracy_Report:
The horizontal location of the benchmark was
taken from a hand held G.P.S. unit. The vertical data
was collected using a Wild NA-2 Level. Coordinates are
                               based on the Florida State Plane Coordinate System, East Zone, NAD 83/90. Elevations are based on NAVD 1988
                               with an offset supplied to convert to NGVD 1929.
          Logical_Consistency_Report:

Vertical data on the monitoring well was established
          using the site bench mark.
Completeness_Report:
                    South Monitoring Well
72.770' (NGVD 1929)
                                               TOHO-16 Well.
                    Offset written at wells (-) 1.040' to NAVD 1988.
                    North Monitoring Well
                               (NGVD 1929)
                                               TOHO-16 Well.
                    72.607
                    Offset written at wells (-) 1.040' to NAVD 1988. TOHO-16 2006 was the site benchmark used for this
                    survey. NAVD 1988 elevation 68.077'
          Posi ti onal _Accuracy:
    Hori zontal _Posi ti onal _Accuracy:
                               Horizontal_Positional_Accuracy_Report:
The horizontal position of the benchmark
                                         was established using a hand held GPS.
                               Quanti tati ve_Hori zontal _Posi ti onal _Accuracy_Assessment:
                                         Horizontal_Positional_Accuracy_Value: Lat.
28°10'01.2" Long. 81°16'17.3"
                                         Horizontal_Positional_Accuracy_Explanation: Value
derived by hand-held GPS unit.
                    Vertical_Positional_Accuracy:
                               Verti cal _Posi ti onal _Accuracy_Report:
                                         The onsite benchmark was used to establish the
                                         elevations on the monitoring well(s) in this report.
                               Quanti tati ve_Verti cal _Posi ti onal _Accuracy_Assessment:
                                         Vertical_Positional_Accuracy_Value: 0.015ft. NAVD88
Vertical_Positional_Accuracy_Explanation: Better
than 0.03ft. x sq. root of miles of the level loop.
          Li neage:
                    Process_Step:
                               Process_Description:
                                         Differential leveling was performed using a Wild
NA-2
                                         level. The onsite bench mark TOHO-16 2006 was used
to
                                         determine the monitoring well elevation. Elevations
were
                                         written at the wells in NGVD 1929 with an offset
provi ded
                                         to convert the elevations to NAVD 1988.
                               Process_Date: 20060727
Spatial_Reference_Information:
          Hori zontal _Coordi nate_System_Defi ni ti on:
                    Geographi c:
                               Latitude_Resolution: 28°10'01.2"
Longitude_Resolution: 81°16'17.3"
                               Geographic_Coordinate_Units: Degrees, minutes, and decimal
seconds
Distribution_Information:
          Di stri butor:
                    Contact_Information:
                               Contact_Organi zati on_Pri mary:
                                                  Page 2
```

TOHO 16. met Contact_Organization: Keith and Schnars, P.A. Contact_Person: Kenneth T. Glass, P.S.M. Contact_Position: Director of Surveying and Mapping Lakeland Contact_Address: Address_Type: mailing and physical address Address: 2525 Drane Field Rd., Suite 7 City: Lakel and State_or_Province: Florida Postal_Code: 33811 Country: Pol k
Contact_Voi ce_Tel ephone: (863)-646-4771 Contact_voice_lelephone: (863)-646-4771
Contact_Facsimile_Telephone: (863)-646-3378
Contact_Electronic_Mail_Address: kglass@keithandschnars.com
Hours_of_Service: 8:00-5:00 est.

Distribution_Liability: None Metadata_Reference_Information: Metadata_Date: 20060809 Metadata Contact: Contact_Information: Contact_Person_Pri mary: Contact_Person: Kenneth T. Glass, P.S.M.
Contact_Organization: Keith and Schnars, P.A.
Contact_Position: Director of Surveying and Mapping Lakeland Contact_Address: Address_Type: mailing and physical address Address: 2525 Drane Field Rd., Suite 7 City: Lakel and State_or_Province: FL Postal_Code: 33811 Country: USA
Contact_Voi ce_Tel ephone: (863) 646-4771
Contact_Facsi mile_Tel ephone: (863) 646-3378
Contact_El ectroni c_Mail_Address: kgl ass@kei thandschnars.com Hours_of_Service: 8:00 am to 5:00 pm EST
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata Metadata_Standard_Version: 19940608



SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Rev. 4/01

				NCV. 4/01					
COUNTY	PROJECT		DESIGNATION						
OSCEOLA			Structure: BM TOHO-16A						
SECTION 1	TOWNSHIP 27	SOUTH	RANGE 30 EAST						
GEOGRAPHIC INDEX OF QUAD									
Established by KEITH AND SCHNA	ARS	NAME OF QUADRANGLE							
Recovered by		ST. CLOUD SOUTH	<u>l</u>						
SET CLASS "C" MONUNENT WITH BRASS DISK.	SFWMD								
SURVEYOR D. SULLIVAN (Keith a DATE 06/29/2006	nd Schnars)	FIELD BOOK, 1156	, pgs. 39-	43					
HORIZONTAL DATUM: 1983 with	1999 correcti	on, ZONE East							
VERTICAL DATUM: NGVD 192	9 and NAVD 1	1988							
CONTROL ACCURACY: HORIZO	NTAL HAND-HEL	D GPS, 3 rd Order V	ERTICAL						
STATE PLANE COORDINATES	X = 568699	Y = 1393518		EL. (NGVD 1929)					
				69.117'					
				EL. (NAVD 1988)					
				68.077'					
LATITUDE <u>28º 10' 01.2"</u>		LC	NGITUDE	81º 16' 17.3"					
	DESC	RIPTION							
South Florida Water Management Dis	strict brass disk se	t in concrete monume	nt stampe	d TOHO 16A / 2006					
The benchmark is located 5.7 miles s									
To reach the mark from the intersection Vermont Ave. a distance of 5.9 miles									
Then travel East along Quail Roost R	1								
Along Edsel Rd. A distance of 94' to									
Corner of the garage in 6' Chain link									
Notable Land manus									
Notable Land marks:									

SKETCH





The NGS Data Sheet

See file <u>dsdata.txt</u> for more information about the datasheet.

```
AJ6659 DESIGNATION - R 506
AJ6659 PID - AJ665
         PID - AJ6659
STATE/COUNTY- FL/OSCEOLA
 AJ6659
 AJ6659
         USGS QUAD - ST CLOUD SOUTH (1980)
 AJ6659
 AJ6659
                                       *CURRENT SURVEY CONTROL
 AJ6659
 AJ6659
                                                     081 16 09.
 AJ6659* NAD 83(1986) - 28 09 20.
                                              (N)
                                                                         (W)
                                                                                  SCALED
 AJ6659* NAVD 88
                                                                        (feet)
                                    21.461
                                             (meters)
                                                               70.41
                                                                                  ADJUSTED
 AJ6659
          GEOID HEIGHT-
 AJ6659
                                     -27.83
                                              (meters)
                                                                                  GEOID03
          DYNAMIC HT -
                                      21.429 (meters)
 AJ6659
                                                                70.31
                                                                        (feet)
                                                                                  COMP
                                979,153.8
 AJ6659
          MODELED GRAV-
                                                                                  NAVD 88
                                               (mgal)
 AJ6659
 AJ6659
          VERT ORDER - SECOND
                                        CLASS I
 AJ6659
 AJ6659. The horizontal coordinates were scaled from a topographic map and have
 AJ6659.an estimated accuracy of +/- 6 seconds.
 AJ6659. The orthometric height was determined by differential leveling
 AJ6659.and adjusted by the National Geodetic Survey in April 2004..
 AJ6659
 AJ6659. The geoid height was determined by GEOID03.
AJ6659. The dynamic height is computed by dividing the NAVD 88 AJ6659. geopotential number by the normal gravity value computed on the AJ6659. Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
 AJ6659.degrees latitude (q = 980.6199 \text{ gals.}).
 AJ6659
 AJ6659. The modeled gravity was interpolated from observed gravity values.
 AJ6659
                                                            Units Estimated Accuracy MT (+/- 180 meters Scaled)
 AJ6659;
                                                  East
                                 North
 AJ6659; SPC FL E
                                               173,560.
                              423,480.
 AJ6659
 AJT6659
                                        SUPERSEDED SURVEY CONTROL
 AJ6659
 AJ6659.No superseded survey control is available for this station.
 AJ6659
 AJ6659_U.S. NATIONAL GRID SPATIAL ADDRESS: 17RMM735144(NAD 83) AJ6659_MARKER: DD = SURVEY DISK
 AJ6659_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
 AJ6659_STAMPING: R 506 2001
 AJ6659_MARK LOGO: FLDEP
 AJ6659 PROJECTION: FLUSH
 AJ6659_MAGNETIC: B = BAR MAGNET IMBEDDED IN MONUMENT
 \mbox{AJ}6659\_{\rm STABILITY}\colon C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO \mbox{AJ}6659+{\rm STABILITY}\colon SURFACE MOTION
 AJ6659_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
 AJ6659+SATELLITE: SATELLITE OBSERVATIONS - November 22, 2002
 AJ6659
 AJ6659
         HISTORY
                        - Date
                                      Condition
                                                           Report By
         HISTORY
HISTORY
                        - 2001
 AJ6659
                                      MONUMENTED
                                                           FLDED
 AJ6659
                         - 20021122 GOOD
                                                           FLDEP
 AJ6659
                                        STATION DESCRIPTION
 AJ6659
 AJ6659
 AJ6659'DESCRIBED BY FL DEPT OF ENV PRO 2001 (JLM)
 AJ6659'THE MARK IS ABOUT 24.8 MI (39.9 KM) NORTH OF KENSVILLE, 6.6 MI (10.6
AJ6659'KM) SOUTH OF ST. CLOUD, IN SECTION 12, TOWNSHIP 27 SOUTH, RANGE 30 AJ6659'EAST. TO REACH THE MARK FROM THE JUNCTION OF U.S. HIGHWAYS 192, 441 AJ6659'(13TH STREET) AND COUNTY ROAD 523 (VERMONT AVENUE, CANOE CREEK ROAD)
 AJ6659'IN ST. CLOUD, GO SOUTH ON COUNTY ROAD 523 (VERMONT AVENUE, CANOE
 AJ6659'CREEK ROAD) FOR 6.6 MI (10.6 KM) TO THE MARK ON THE LEFT, SET IN THE AJ6659'TOP OF A ROUND CONCRETE MONUMENT FLUSH WITH THE GROUND AND LEVEL WITH
 AJ6659'COUNTY ROAD 523. LOCATED 51.0 FT (15.5 M) SOUTH OF A DRIVEWAY AT 4465,
 AJ6659'46.1 FT (14.1 M) EAST OF THE CENTERLINE OF COUNTY ROAD 523, 6.3 FT
```

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

```
AJ6659'(1.9 M) SOUTH OF POWER POLE NUMBER 6-97534 (143524049006) WITH 3 GUY AJ6659'WIRES AND A TRANSFORMER ATTACHED AND 2.0 FT (0.6 M) WEST OF A AJ6659'CARSONITE WITNESS POST. NOTE A BAR MAGNET WAS IMBEDDED IN THE MONUMENT AJ6659'ON THE SOUTH SIDE, 0.2 FT (6.1 CM) BELOW THE TOP OF THE MONUMENT. AJ6659

AJ6659

STATION RECOVERY (2002)

AJ6659'RECOVERY NOTE BY FL DEPT OF ENV PRO 2002 (JLM)

AJ6659'RECOVERED IN GOOD CONDITION.
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