

**DOWN
Construction
Preliminary Data
Central Florida Zoo**

Aquifer System Monitor Wells:

**Surficial S-1386
Intermediate S-1385
Floridan S-1397
Floridan S-1398**

SJRWMD Program No. 31-58200

**Division of Ground Water Programs,
Department of Resource Management
St. Johns River Water Management District
Palatka, Florida**

September 26, 2000

*All data, figures, tables and information are provisional and generated
for the Division of Ground Water Program's use*

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General Information

Site: Central Florida Zoo

Service Request: Brian McGurk Division of Ground Water Programs

Purpose: Ground water model data for Division of Needs And Sources

Work:

Monitor Well Construction

Huss Drilling Inc.
SJRWMD

Geophysical Logging:

SJRWMD

Video Survey:

Florida Dept. of Transportation (FDOT)

Report: Robert Brooks and John Segó

Notes:

S-1386 (Surficial)

5/08/99, Insufficient recovery/poor producer no groundwater quality sample.

S-1397 (Floridan)

5/17/99, Construction completed first for water supply.

5/10/99, Grout observed flowing from S-1397 during grouting of S-1398.

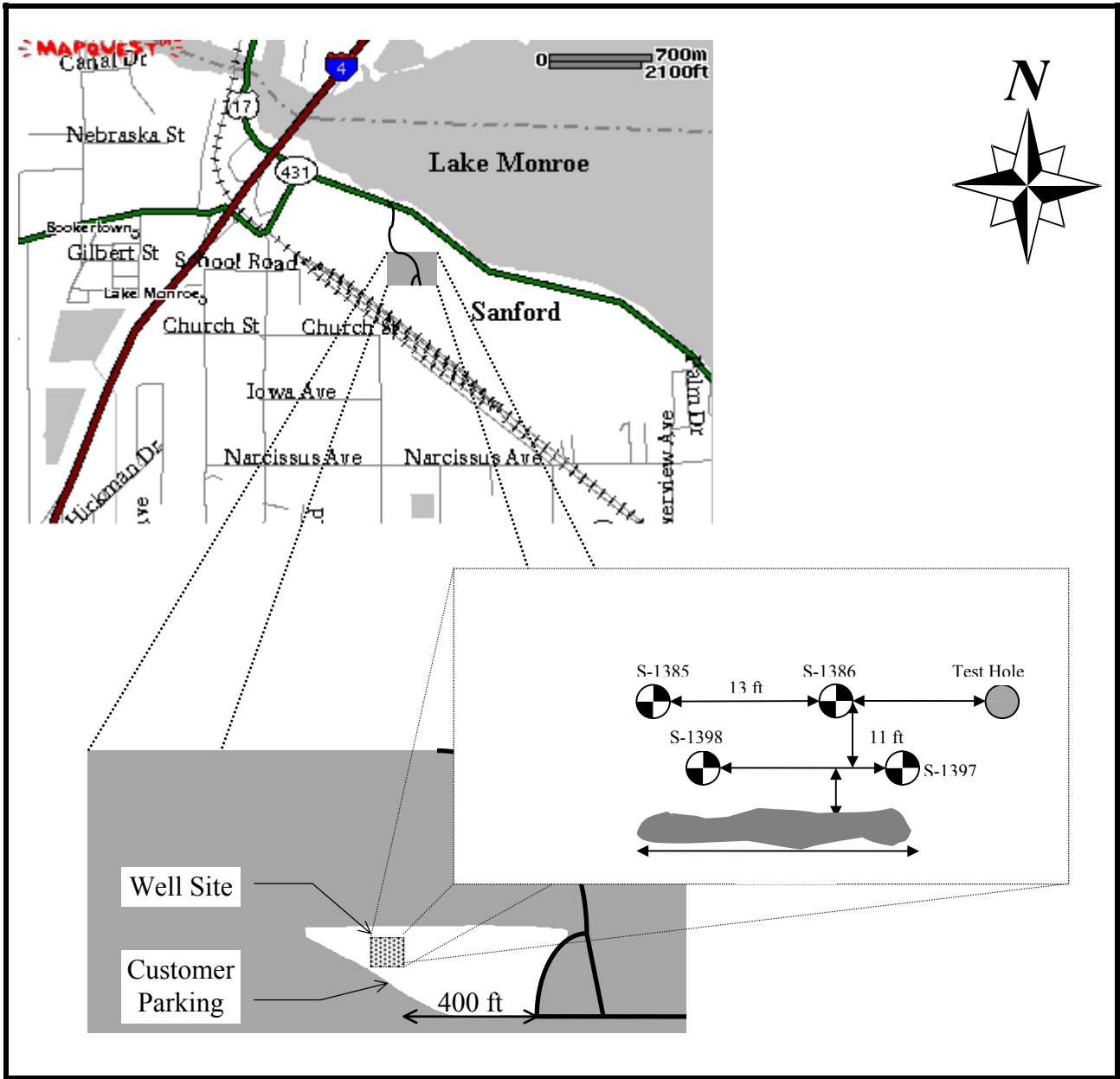
6/15/99, Final caliper indicates total depth at 156 ft. Constructed total depth 180 ft.

Possible grout from S-1398 filled in/plugged bottom 24 ft of bore hole.

S-1398 (Floridan)

4/28/99-5/17/99, Salt used to stop artesian flow during grouting of S-1398. Specific dates and amounts not recorded.

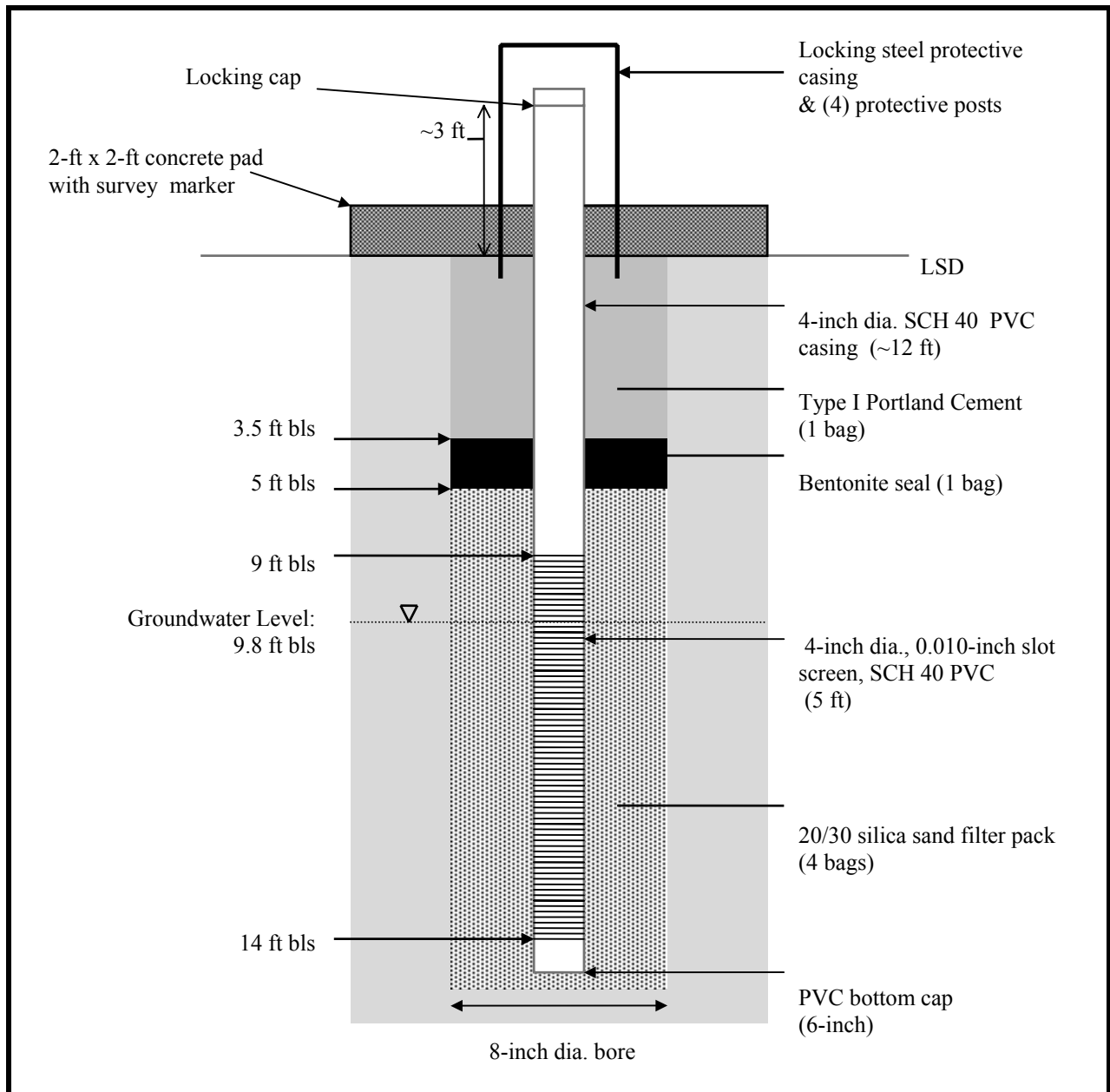
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Site:	Central Florida Zoo
GPS/Lat/Long:	284944/811910
TRS:	193039
Topo:	Sanford
Site Elevation:	~10 ft NGVD
Project No:	31-58200

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Figure 1. Site Map



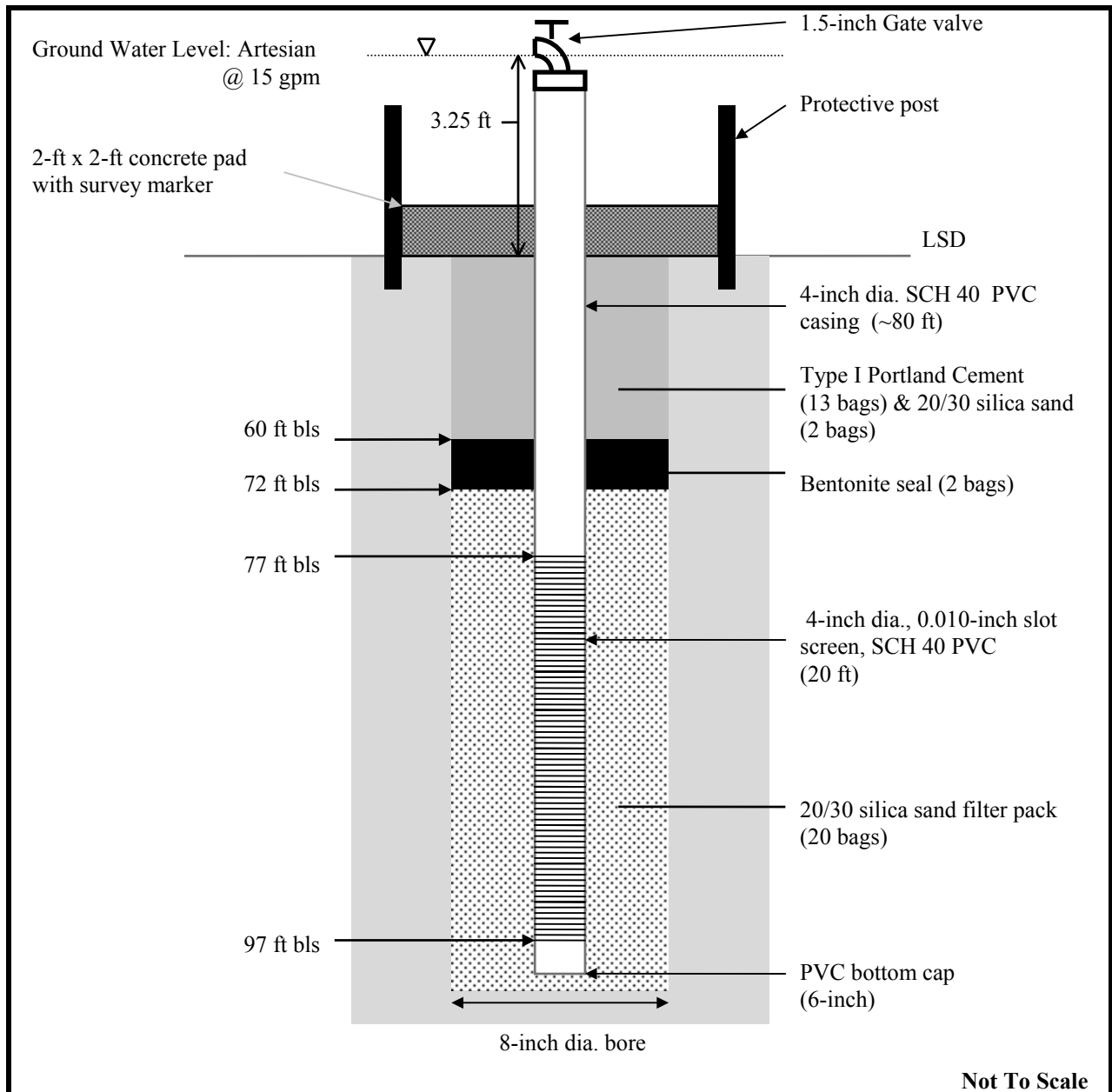
Site: Central Florida Zoo

Driller: Huss Drilling, Inc.

Well Completed: August 5, 1998

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Figure 2. Surficial Monitor Well S-1386



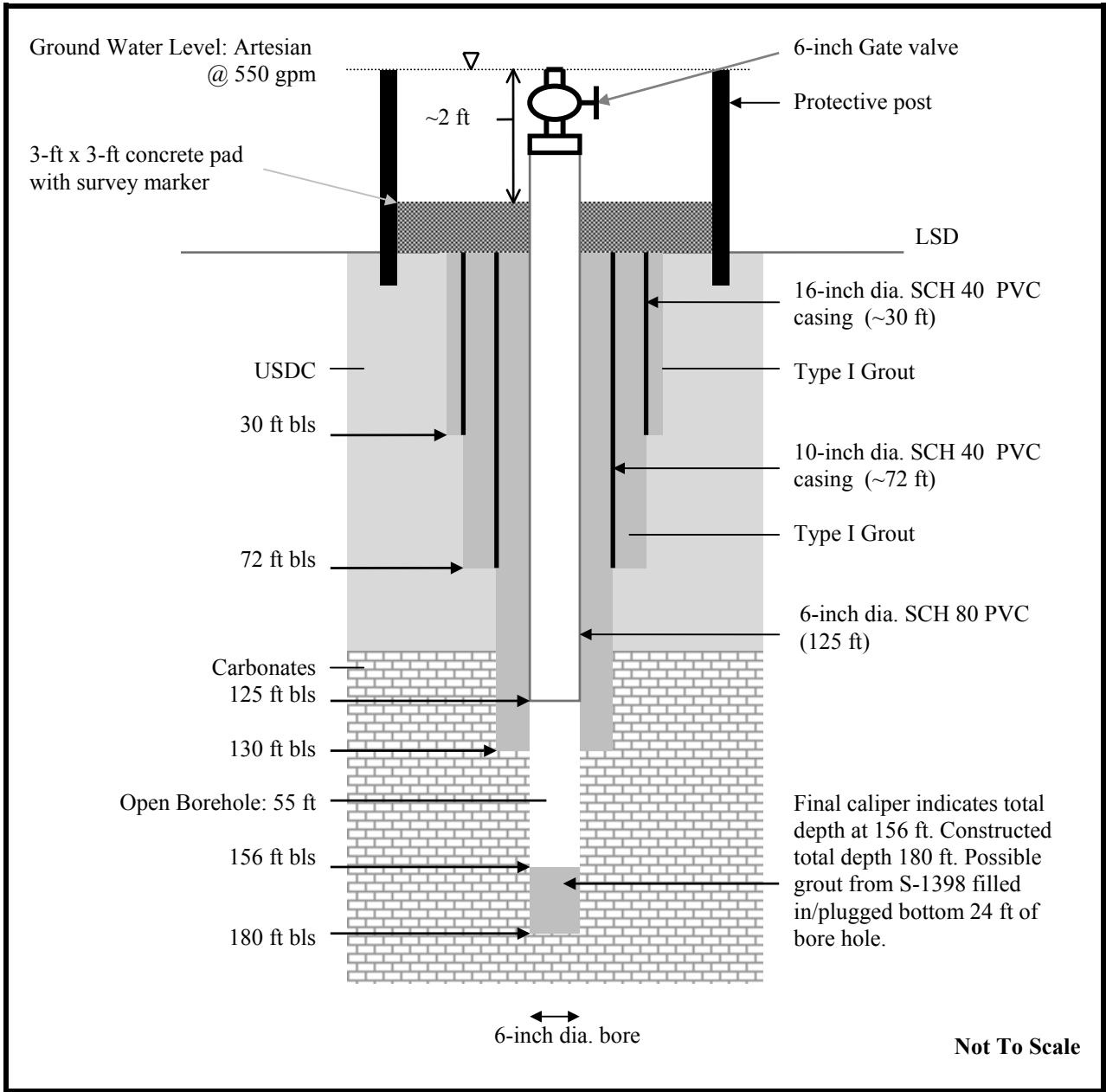
Site: Central Florida Zoo

Driller: Huss Drilling, Inc.

Well Completed: August 4, 1998

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Figure 3. Intermediate Monitor Well S-1385



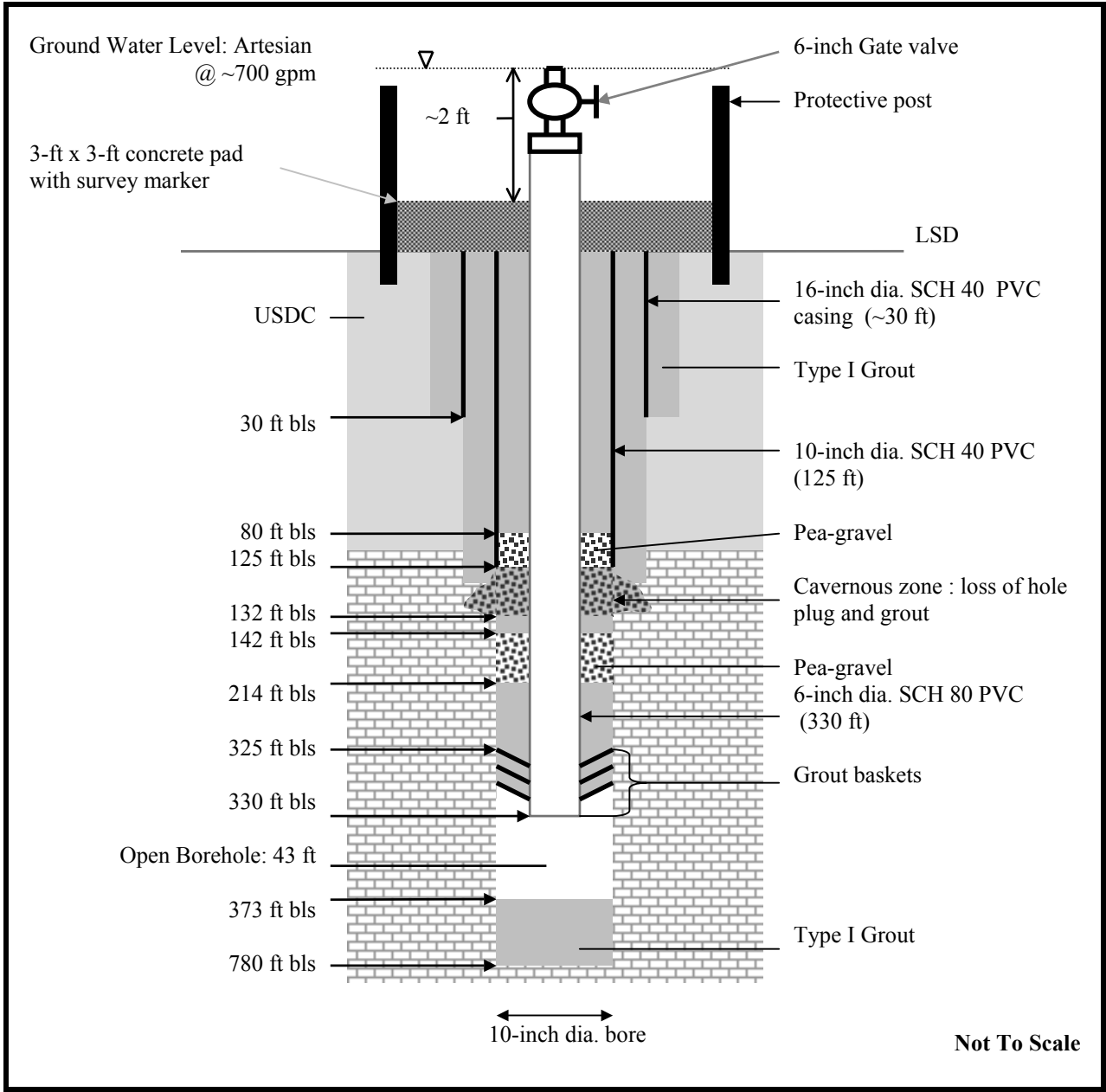
Site: Central Florida Zoo

Driller: SJRWMD

Well Completed: May 17, 1999

SJRWMD

Figure 4. Floridan Monitor Well S-1397



Site: Central Florida Zoo

Driller: SJRWMD

Well Completed: May 17, 1999

SJRWMD

Figure 5. Floridan Monitor Well S-1398

Table 1. Groundwater Levels Post Construction

Site: Central Florida Zoo

Hydrologist: J. Segó

Well ID	Date/Time (yyymmdd/hhmm)	Aquifer System	Screen Interval (ft, bls)	Open Hole (ft)	GWL (ft) - =BTOC + =ATOC	Stick-up (ft)	Artesian Flow (est. gpm)
S-1386	980805-NR	Surficial	9-14	-	-12.8	3.0	0
S-1385	980805-NR	Intermediate	75-85	-	>+3.3	3.3	15
S-1397	990517-NR	Floridan		130-180	>+2.0	2.0	500
S-1398	990517-NR	Floridan	-	330-373	>+2.0	2.0	700

Table 2. Ground Water Levels

Site: Central Florida Zoo

Well Number: S-1397 (Floridan)

Hydrologist: J. Segó

Casing Depth: 125 ft

Water Levels				Well Borehole Characteristics	
Static ✓	Date/Time (yyymmdd/hhmm)	Casing (ft als)	Rod (ft als)	Total Depth (ft bls)	Open Hole (ft)
	990318-0843	0.71	5.45	140	15
	990318-0910	0.71	5.48	150	25
	990318-0940	0.71	5.50	160	35
	990318-1105	0.73	5.54	180	55
✓	990318-1030	11.8	-	180	55

Table 3. Ground Water Levels

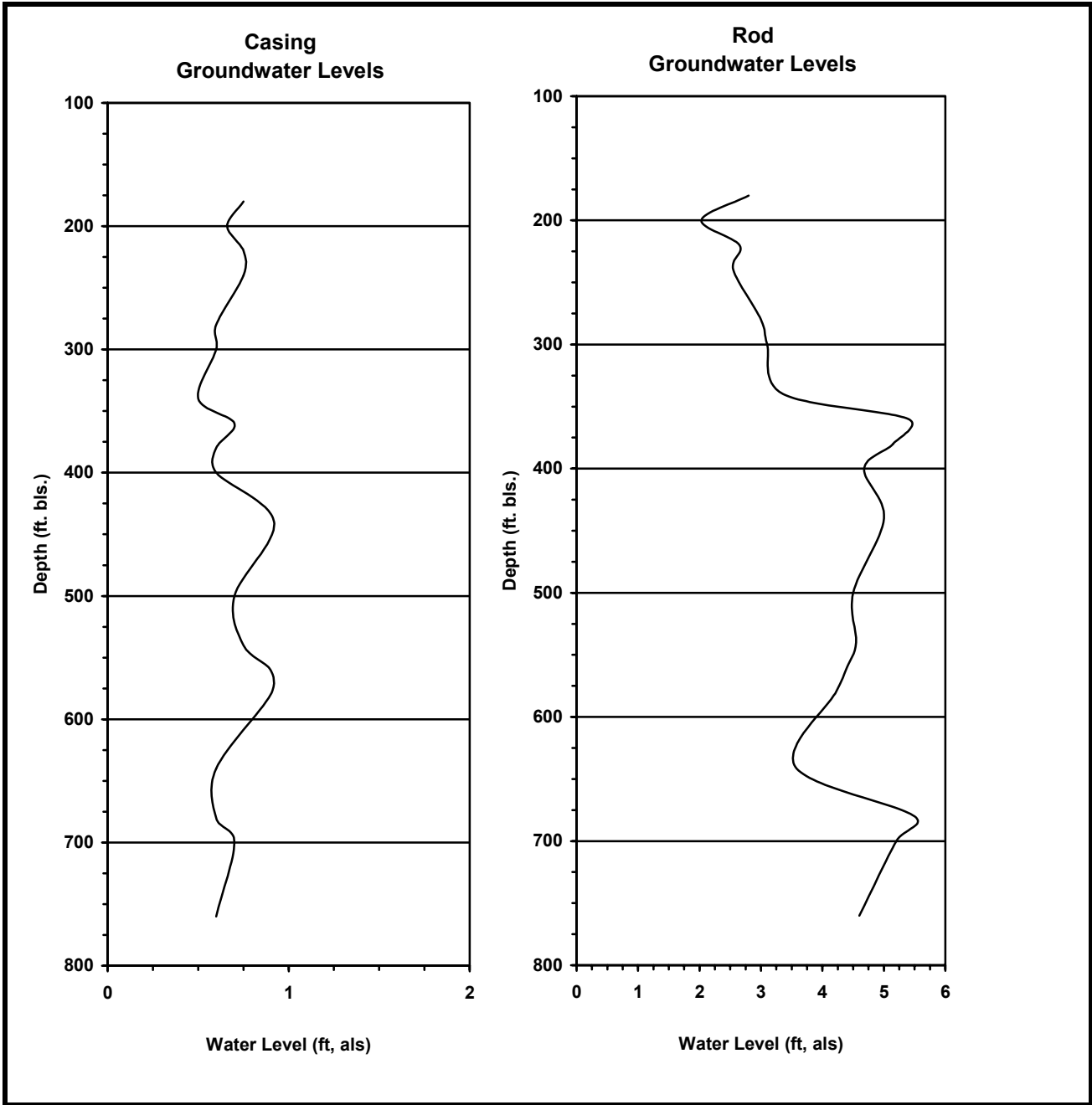
Site: Central Florida Zoo

Well Number: S-1398 (Floridan)

Hydrologist: J. Sego

Casing Depth: 125 ft bls

Water Levels			Well Borehole Characteristics	
Date/Time (yymmdd/hhmm)	Casing (ft als)	Rod (ft als)	Total Depth (ft bls)	Open Hole (ft)
990331-1025	0.75	2.80	180	60
990331-1235	0.66	2.03	200	80
990331-1350	0.75	2.65	220	100
990331-1504	0.75	2.55	240	120
990331-NR	NR	NR	260	140
990401-0905	0.60	3.00	280	160
990401-1025	0.60	3.10	300	180
990405-1355	0.50	3.36	340	220
990406-0945	0.70	5.40	360	240
990406-1200	0.60	5.15	380	260
990406-1320	0.60	4.68	400	280
990407-1450	0.92	5.00	440	320
990412-1118	0.70	4.50	500	380
990414-0935	0.75	4.55	540	420
990414-1220	0.90	4.40	560	440
990414-1430	0.90	4.22	580	460
990420-1335	0.60	3.56	640	520
990421-1025	0.60	5.50	680	560
990421-1352	0.70	5.20	700	580
990422-1200	0.60	4.60	760	640



Site: Central Florida Zoo

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**Figure 6. Drilling Ground Water Levels:
Floridan Monitor Well S-1398**

Table 4. Groundwater Quality

Site: Central Florida Zoo

Well Number: S-1385 (Intermediate)

Hydrologist: J. Sego

Casing Depth: Screened 75-95 ft bls

LAB ✓	Date/Time (yyymmdd-hhmm)	Sample Depth (ft, bls)	Open Hole (ft)	Temp (Deg C)	Conductivity (us/cm)
	980805-0724	95	NA	23	350
	980805-0730	95	NA	23	340
	980805-0740	95	NA	22.5	330
✓	980805-0750	95	NA	22	330
	980805-0815	95	NA	NR	328

Table 5. Groundwater Quality

Site: Central Florida Zoo

Well Number: S-1397 (Floridan)

Hydrologist: J. Sego

Casing Depth: 125 ft

LAB ✓	Date/Time (yy:mm:dd/hh:mm)	Sample Depth (ft, bls)	Open Hole (ft)	Temp (Deg C)	Chloride (mg/L)	Conductivity (us/cm)
✓	990318-1048	180	55	23	44.8	255
✓	990517-1700	180	55	24	101	479

Table 6. Groundwater Quality from Drill Stem (page 1 of 2)

Site: Central Florida Zoo

Well Number: S-1398 (Floridan)

Hydrologist: J. Sego

Casing Depth: 125 ft bls

LAB ✓	Date/Time (yy:mm:dd/hh:mm)	Sample Depth (ft, bls)	Open Hole (ft)	Temp (Deg C)	Chlorides (mg/L)	Conductivity (us/cm)
	990331-1000	180	60	23.6	58	480
	990331-1230	200	80	23.7	40	493
	990331-1346	220	100	23.9	40	559
	990331-1452	240	120	23.6	37	494
	990331-1550	260	140	23.6	27	610
	990401-0900	280	160	23.9	22	621
	990401-1000	300	180	24.0	23	748
	990401-1130	320	200	24.6	20	846
	990405-1334	340	220	23.2	158	725
✓	990406-0930	360	260	23.0	450	1940
	990406-1050	380	260	23.5	700	2950
	990406-1240	400	280	23.5	842	3760
✓	990406-1535	420	300	23.5	1485	5700
	990407-1215	440	320	23.8	1700	6840
	990408-0829	460	340	23.6	1705	6660
	990412-1626	480	360	22.7	1185	6500
	990413-1047	500	380	24.1	1840	6520
	990413-1515	520	400	23.6	1860	6430
	990414-0930	540	420	24.6	1600	6350
	990414-1220	560	440	24.0	1650	6410
	990414-1415	580	460	23.9	1810	6820
	990414-1620	600	480	23.9	1460	6320

Table 6. Groundwater Quality from Drill Stem (page 2 of 2)

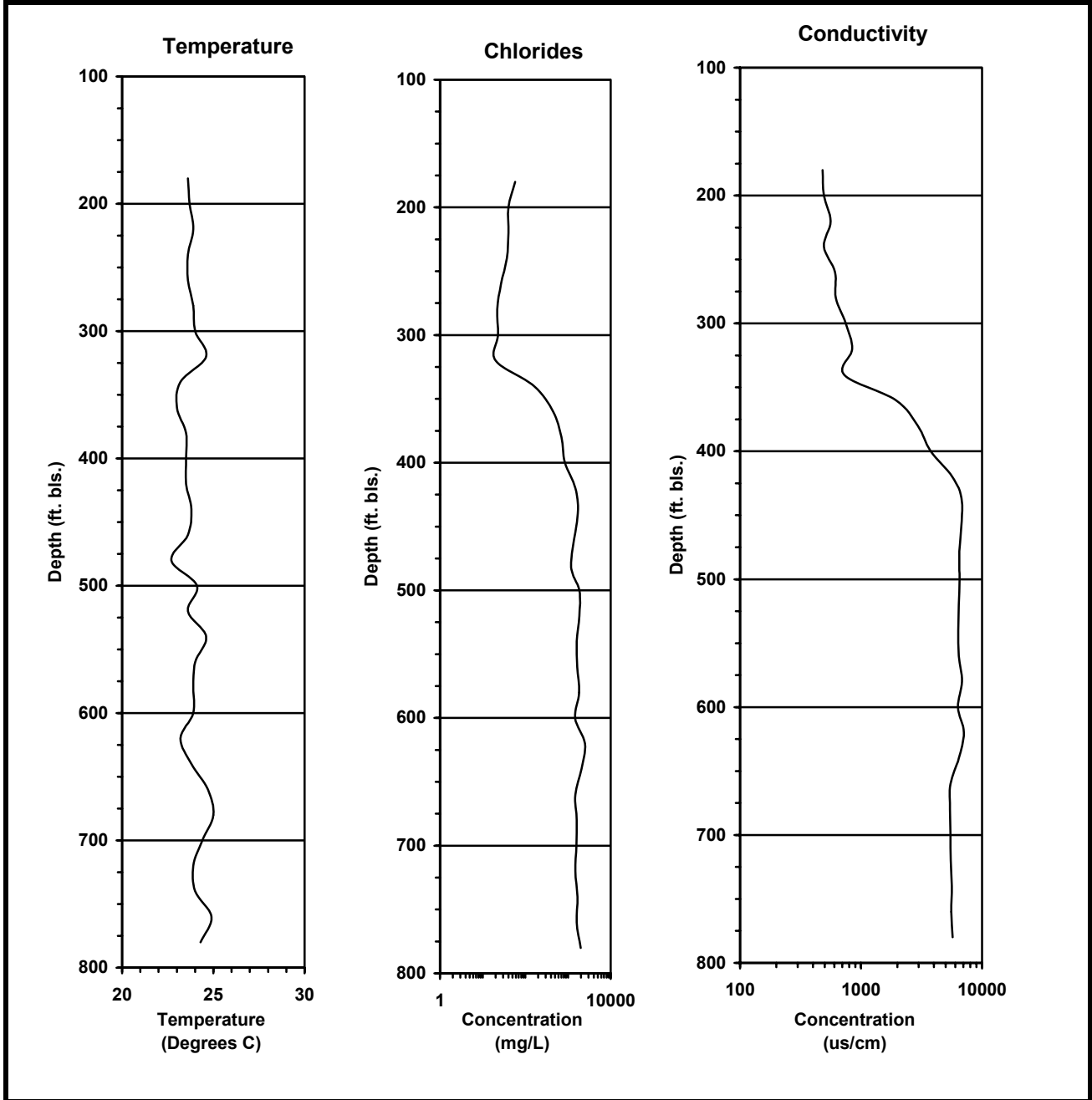
Site: Central Florida Zoo

Well Number: S-1398 (Floridan)

Hydrologist: J. Sego

Casing Depth: 125 ft bls

LAB ✓	Date/Time (yy:mm:dd/hh:mm)	Sample Depth (ft, bls)	Open Hole (ft)	Temp (Deg C)	Chlorides (mg/L)	Conductivity (us/cm)
	990420-1000	620	500	23.2	2500	7060
	990420-1325	640	520	23.8	2080	6420
	990420-1605	660	540	24.7	1490	5490
	990421-1020	680	560	25.0	1590	5420
	990421-1320	700	580	24.4	1580	5480
	990421-1615	720	600	23.9	1480	5510
	990422-0830	740	620	24.0	1660	5620
	990422-1140	760	640	24.9	1600	5570
	990422-1415	780	660	24.3	1975	5710



Site: Central Florida Zoo

Project No: 31-58200

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**Figure 7. Drill Stem Ground Water Quality:
Floridan Monitor Well S-1398**

Table 7. Groundwater Quality Flowing from Casing*

Site: Central Florida Zoo

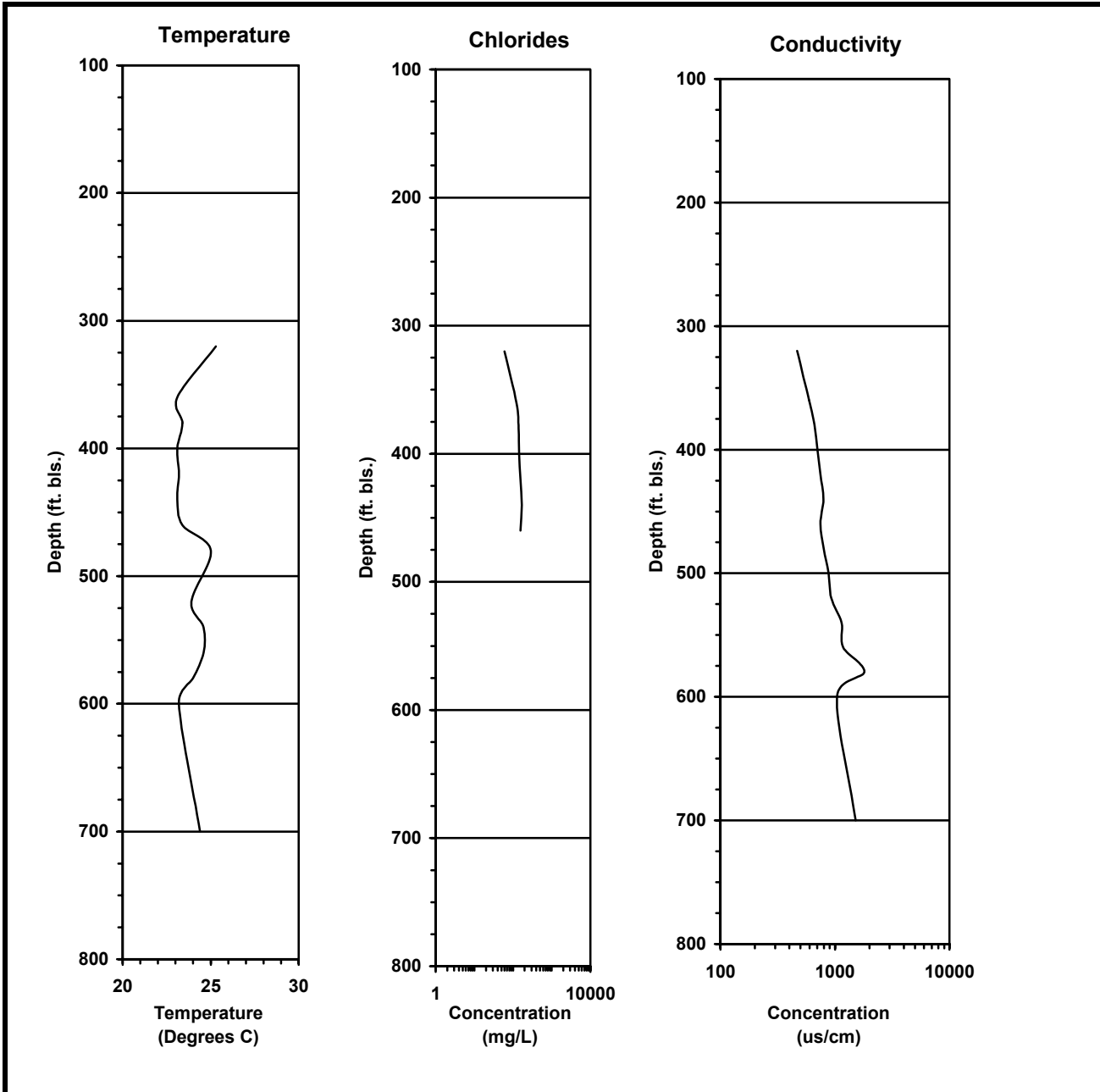
Well Number: S-1398 (Floridan)

Hydrologist: J. Sego

Casing Depth: 125 ft bls

Date/Time (yy:mm:dd/hh:mm)	Sample Depth (ft, bls)	Open Hole (ft)	Temp (Deg C)	Chlorides (mg/L)	Conductivity (us/cm)
990401-1130	320	200	25.3	60	468
990406-0930	360	260	23.1	123	594
990406-1050	380	260	23.4	139	662
990406-1240	400	280	23.1	144	704
990406-1535	420	300	23.2	155	749
990407-1215	440	320	23.1	168	795
990408-0844	460	340	23.4	155	747
990412-1400	480	360	25.0	NR	797
990413-1047	500	380	NR	NR	880
990413-1515	520	400	23.9	NR	927
990414-0930	540	420	24.6	NR	1140
990414-1220	560	440	24.6	NR	1180
990414-1415	580	460	24.0	NR	1810
990414-1620	600	480	23.2	NR	1042
990421-1320	700	580	24.4	NR	1514

* Sample point from top of casing, estimated flow 1500 to 3500 gpm.



Site: Central Florida Zoo

Project No: 31-58200

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Figure 8. Casing Ground Water Quality:
Floridan Monitor Well S-1398

Table 8. Down Hole Sample Groundwater Quality

Site: Central Florida Zoo

Well Number: S-1398(Floridan)

Hydrologist: J. Sego

Casing Depth: 125 ft bls

Date/Time (yy:mm:dd/hh:mm)	Sample Depth (ft, bls)	Open Hole (ft)	Temp (Deg C)	Chlorides (mg/L)	Conductivity (us/cm)
Well Flowing					
990415-1220	330	210	25.6	394	1434
990415-1240	365	245	25.2	422	1695
990415-1250	595	475	26.3	484	1927
Well Not Flowing*					
990427-1539	325	205	25.9	275	945
990427-1550	375	255	26.1	330	1202
990427-1600	780	660	26.6	410	1296

* Casing extended to 20-ft above land surface.

Table 9. Groundwater Quality Post Construction

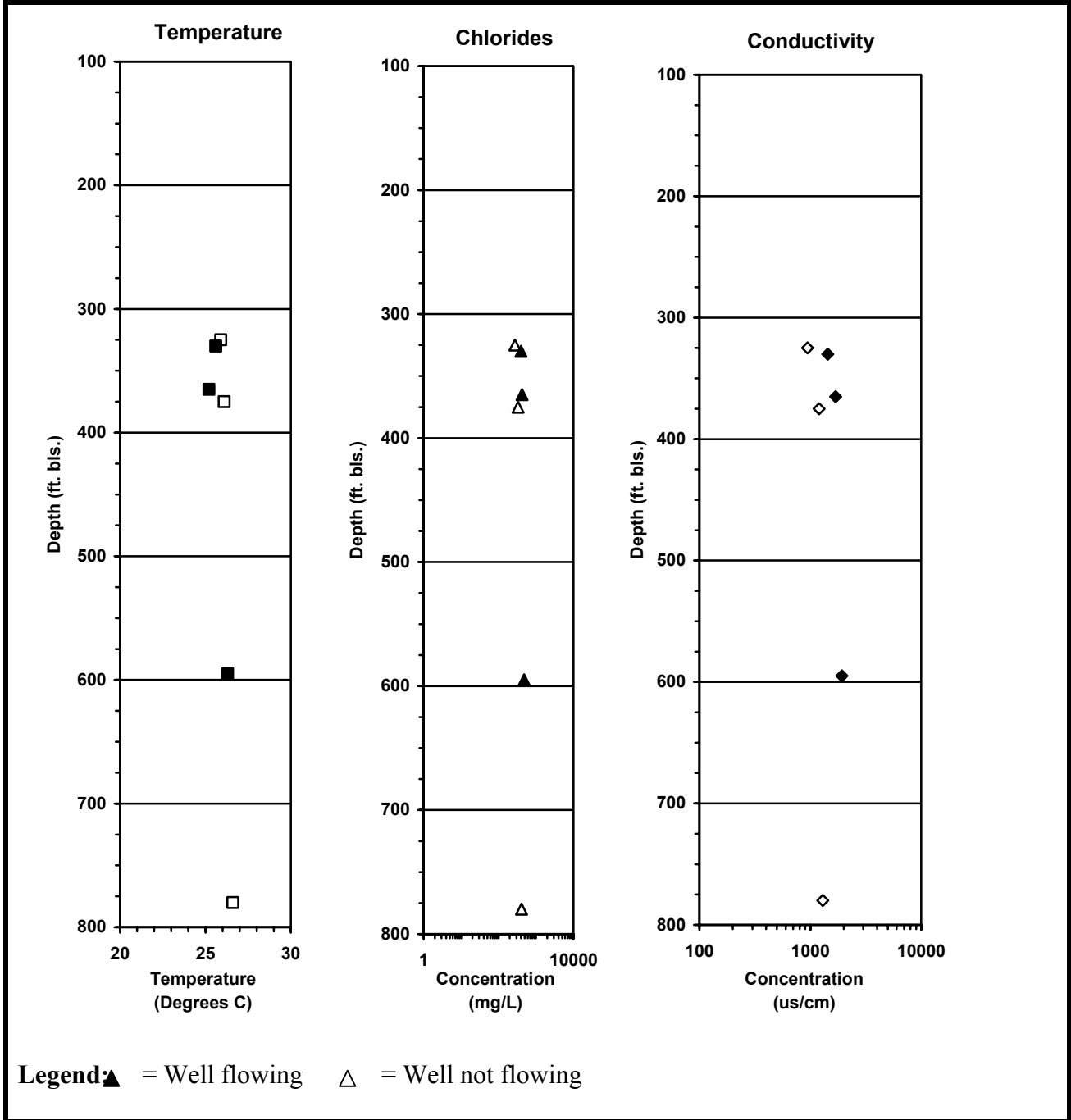
Site: Central Florida Zoo

Well Number: S-1398(Floridan)

Hydrologist: J. Sego

Casing Depth: 125 ft bls

LAB ✓	Date/Time (yy:mm:dd/hh:mm)	Sample Depth (ft, bls)	Open Hole (ft)	Temp (Deg C)	Chlorides (mg/L)	Conductivity (us/cm)
✓	990520-1320	330	43	23.9	344	1494



Site: Central Florida Zoo

Project No: 31-58200

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Figure 9. Down Hole Sample Groundwater Quality: Floridan Monitor Well S-1398

Table 10.**Grout Data**Site: Central Florida ZooWell Number: S-1397 (Floridan)

DATE	TAG DEPTH (ft bls)	ANNULUS/BORE (inch)	VOLUME (BAGS)	GROUT/MATERIAL	COMMENTS
3/15/99	30	22-A	21 bgs	Type I Grout	Grout through tremie pipe 30 ft of 16-inch dia. SCH 40 PVC casing
3/16/99	2	22-A	0	NA	Tag annulus 2 ft bls
3/16/99	72	15-A	33 bgs	Type I Grout	Grout through tremie pipe 72 ft of 10-inch dia. SCH 40 PVC casing
3/17/99	130	10-A	44 bgs	Type I Grout	Grout through tremie pipe 125 ft of 6-inch dia. SCH 80 PVC casing
3/17/99	6	10-A	0	NA	Tag annulus 6 ft bls
5/17/99	6	10-A	1	Type I Grout	Tag annulus 6 ft bls

Table 11.**Grout Data**Site: Central Florida ZooWell Number: S-1398 (Floridan)

DATE	TAG DEPTH (ft bls)	ANNULUS/BORE (-inch dia.)	VOLUME (bags/yds)	GROUT/MATERIAL	COMMENTS
3/23/99	30	22-A	21 bags	Type I Grout	Grout through tremie pipe 30 ft of 16-inch dia. SCH 40 PVC
3/25/99	130	15-A	3.5 yds	Type I Grout	Pressure grout 125 ft of 10-inch dia. SCH 40 PVC; no return
4/28/99	330	10-A	4 bags 10 bags	Hole plug Type I Grout	Grout through tremie 330 ft of 6-inch dia. SCH 80 PVC
4/29/99	315	10-A	20 bags	Type I Grout	Tremie grout
4/30/99	294	10-A	100 bags	Type I Grout	Tremie grout
5/03/99	255	10-A	50 bags	Type I Grout	Tremie grout
5/04/99	222	10-A	50 bags	Type I Grout	Tremie grout
5/04/99	215	10-A	50 bags	Type I Grout	Tremie grout
5/05/99	214	10-A	2 yds	Pea-gravel	Gravel used to fill voids
5/05/99	142	10-A	25 bgs	Type I Grout	Tremie grout
5/06/99	127	10-A	50 bags	Type I Grout	Tremie grout
5/06/99	127	10-A	10 bags	Hole plug	Pour hole plug in from top of casing
5/07/99	122	10-A	15 bags	Hole plug	Pour hole plug in from top of casing
5/10/99	102	10-A	38 bags	Type I Grout	Tremie grout; hole plug and grout return out of S-1397, S-1398 still flowing after pumping grout
5/10/99	~132	10-A	1 yd	Pea-gravel	Gravel used to fill voids
5/11/99	80	10-A	10 bgs	Type I Grout	Tremie grout
5/12/99	48	10-A	35 bgs	Type I Grout	Tremie grout
5/13/99	775	10-B	100 bgs	Type I Grout	Backplug
5/13/99	697	10-B	100 bgs	Type I Grout	Backplug
5/14/99	554	10-B	100 bgs	Type I Grout	Backplug
5/14/99	424	10-B	30 bgs	Type I Grout	Backplug
5/15/99	412	10-B	½ yd	Pea-gravel	Backplug
5/15/99	398	10-B	15 bgs	Type I Grout	Backplug
5/17/99	373	10-B	-	-	Tag bore hole at 373 ft bls
5/17/99	4	10-A	1	Holeplug	Casing grouted to surface

Lithologic Description

Site: Central Florida Zoo

Well ID: S-1385 (Intermediate)

Samples Described By: J. Segó

From (ft)	To (ft)	Hammer Blow Counts	Lithology
0	0	NA	Sand, medium fine, gray, with organic material
4	6	12/12/11/10	Sand, medium fine, gray, with clay, stiff, friable
6	8	6/12/25/20	Sand, medium fine, and clay, gray, with blebs of weathered shell/clay, white
8	10	12/12/12/20	Clay, gray, with lenses of green clay and medium fine sand and blebs of weathered shell/clay, white
10	12	4/5/7/7	Clay, gray, with lenses of green clay and medium fine sand
12	14	5/12/14/15	Clay, gray, with lenses of green clay and medium fine sand to 13 ft bls, clay, gray, fat/slick
14	16	2/3/4/6	Clay, gray, fat/slick to 15 ft bls, clay, black, stiff to 16 ft bls
16	18	4/6/7/5	Clay, gray, fat/slick
18	20	3/3/3/5	Clay, gray, fat/slick to 19 ft bls, clay, gray-black, with thin beds of shell to 20 ft bls
20	22	4/5/5/6	Clay, gray-black, with thin beds of shell to 21 ft bls, silt/clay, brown, organic, with shell
22	24	3/4/4/5	Silt/clay, brown-gray and shell poorly indurated
24	26	1/2/2/1	Silt/clay, brown-gray and shell poorly indurated to 24.5 ft bls, shell bed 24.5 to 25 ft bls, silt clay, tan interbedded with brown silt/clay to 26 ft bls
29	31	-	Silt/peat, brown-dark brown, with some sand, medium fine, gray
34	36	8/12/20/20	Sand, medium fine, gray
39	41	13/13/18/20	Sand, medium fine, gray, with some silt
44	46	6/6/7/8	Sand, medium fine, gray, with some silt
49	51	6/6/5/5	Sand, medium fine, gray, with some silt, with some orange-gray clay
54	56	3/3/5/6	Sand, medium fine, gray
59	61	3/3/5/6	Sand, medium fine, gray
64	66	3/3/5/6	Clay and silt, gray-blue, stiff, with sand stringers, medium fine, gray-black
69	71	Shelby Tube	Clay and silt, gray-blue
74	76	3/10/20/6	Sand, medium fine, white-gray, with clay, green-blue
79	81	5/6/7/7	Sand, gray, indurated, calcareous and coquina

Lithologic Description

Site: Central Florida Zoo

Well ID: S-1385 (Intermediate)

Samples Described By: J. Segó

From (ft)	To (ft)	Hammer Blow Counts	Lithology
84	86	4/7/7/6	Sand, gray, indurated, calcareous and coquina
89	91	8/12/18/42	Shell, tan, and sand, medium fine, green-gray, with coquina
94	96	7/9/11/18	Sand, fine, gray and silt, with shell
99	101	6/8/10/15	Sand, fine, gray and silt, with shell
104	106	5/7/12/13	Shell, with silt/clay, gray
109	111	6/7/9/9	Shell, with silt/clay, gray
114	116	7/6/5/5	Shell, with clay, gray
119	121	5/5/5/6	Sand, medium fine, gray, with silt
121	130	NA	Limestone, gray-tan, fragmental

Lithologic Description

Site: Central Florida Zoo

Well ID: S-1397 (Floridan)

Samples Described By: A. Story

From (ft)	To (ft)	Lithology
100	120	Sand, brown, medium-fine, with shell and sandstone
120	130	Limestone, dark tan, well indurated
130	134	Limestone, gray, well indurated
134	138	Limestone, tan, well indurated
138	141	Limestone, light gray, indurated
141	146	Clay, crème-white
146	156	Limestone, crème-white, poorly indurated
156	160	Clay, crème-white
160	163	Limestone, dark tan, dolomitic, well indurated
163	180	Limestone, light tan, poorly indurated, with clay

Lithologic Description

Site: Central Florida Zoo

Well Number: S-1398 (Floridan)

Hydrologist: J. Sego

From (ft)	To (ft)	Lithology
180	190	Limestone, tan-dark tan, dolomitic, hard, pin point porosity
190	195	Limestone, tan-gray, dolomitic, fossiliferous (<i>echinoids</i>)
195	215	Limestone, tan-dark, dolomitic, pin point porosity, fossiliferous (<i>echinoids and dictyconus</i>)
215	230	Limestone, tan, soft, with peaty silt
230	238	Limestone, gray, moldic porosity, fossiliferous (<i>echinoids</i>)
238	250	Limestone, tan, and clay, gray, pinpoint porosity
250	280	Limestone, tan, dolomitic, hard, pinpoint porosity
280	290	Limestone, tan, trace peaty silt
290	320	Limestone, tan, dolomitic, hard, pinpoint and moldic porosity, fossiliferous (<i>dictyconus</i>), cherty 92 ft bls, peaty silt 298 ft bls
320	326	Dolomite, tan, pinpoint porosity
326	370	Dolomite, tan, peaty, moldic porosity, sulfurous odor hard-cherty 340 ft, bls
370	380	Limestone, tan, fossiliferous (<i>dictyconus</i>), limestone, with white and gray
380	400	Limestone, dark tan, dolomitic, pinpoint porosity
400	420	Limestone, tan and gray
420	440	Limestone, crème colored, with dolomite, tan, hard
440	466	Limestone, tan-white, with some dolomite brown
466	472	Limestone, tan and gray, dolomitic, with dolomite, tan-brown, hard
472	520	Dolomite, tan-brown, hard, cherty 494 ft bls, with indurated peat 515 ft bls, clay, gray 519 ft bls
520	590	Limestone, tan, dolomitic, pinpoint and moldic porosity, hard 560-580 ft bls
590	600	Limestone, brown, soft, with silt
600	780	Dolomite, tan-brown, hard, cherty, with limestone, tan, pinpoint porosity

Table 12.**Video Surveys**

Date	Logger	Well ID	Casing/ Bore dia. (inch)	Survey Depth (ft bls)	Depth (ft bls)
4/26/99	FDOT	S-1398	6/10	783	780

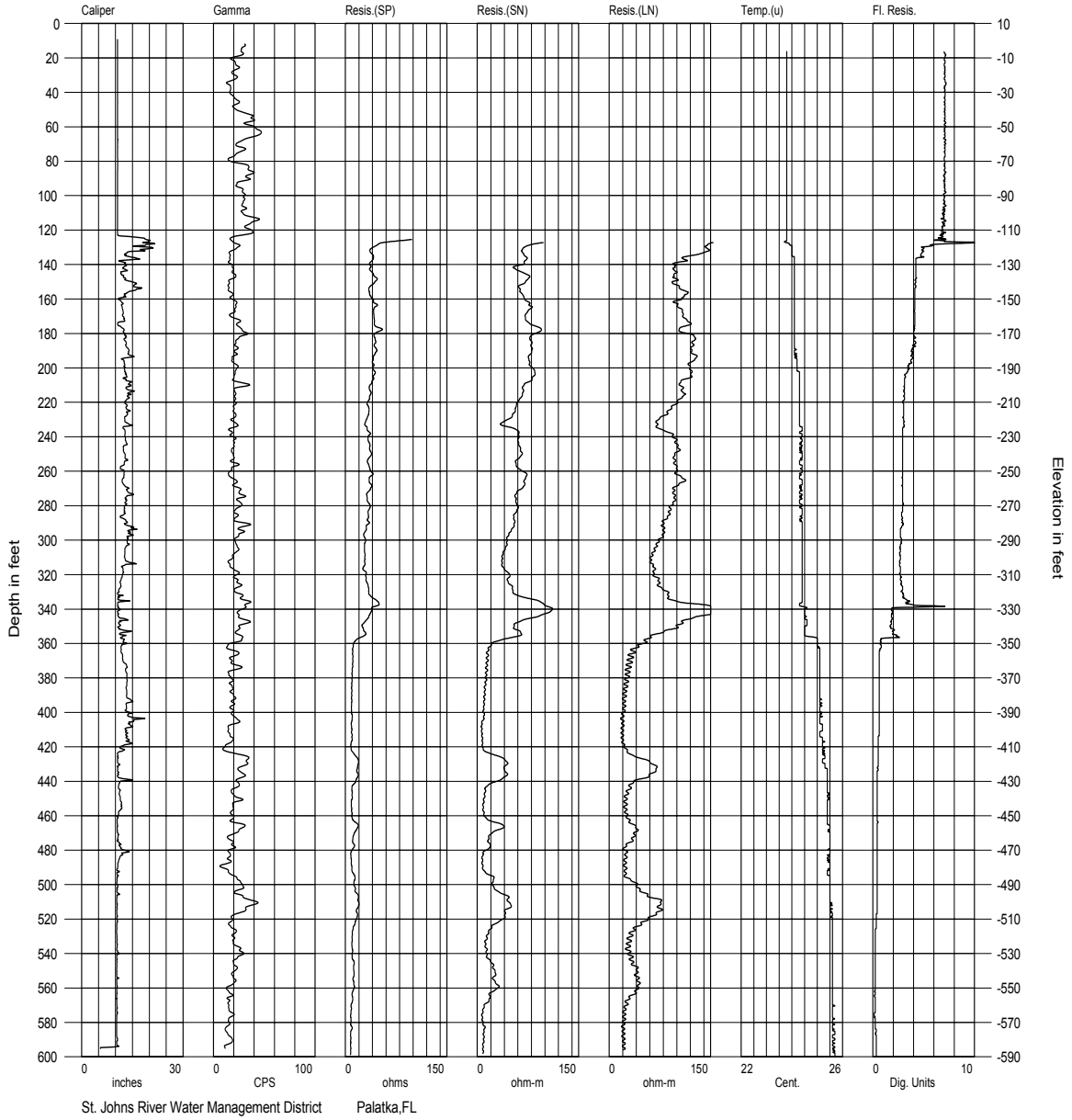
Geophysical Logs

Site: Central Florida Zoo

Monitor Well: S-1398 (Floridan)

Logger: SJRWMD

Date Logged: 4/15/99



Geophysical Logs

Site: Central Florida Zoo

Monitor Well: S-1398 (Floridan)

Logger: SJRWMD

Date Logged: 5/-/99

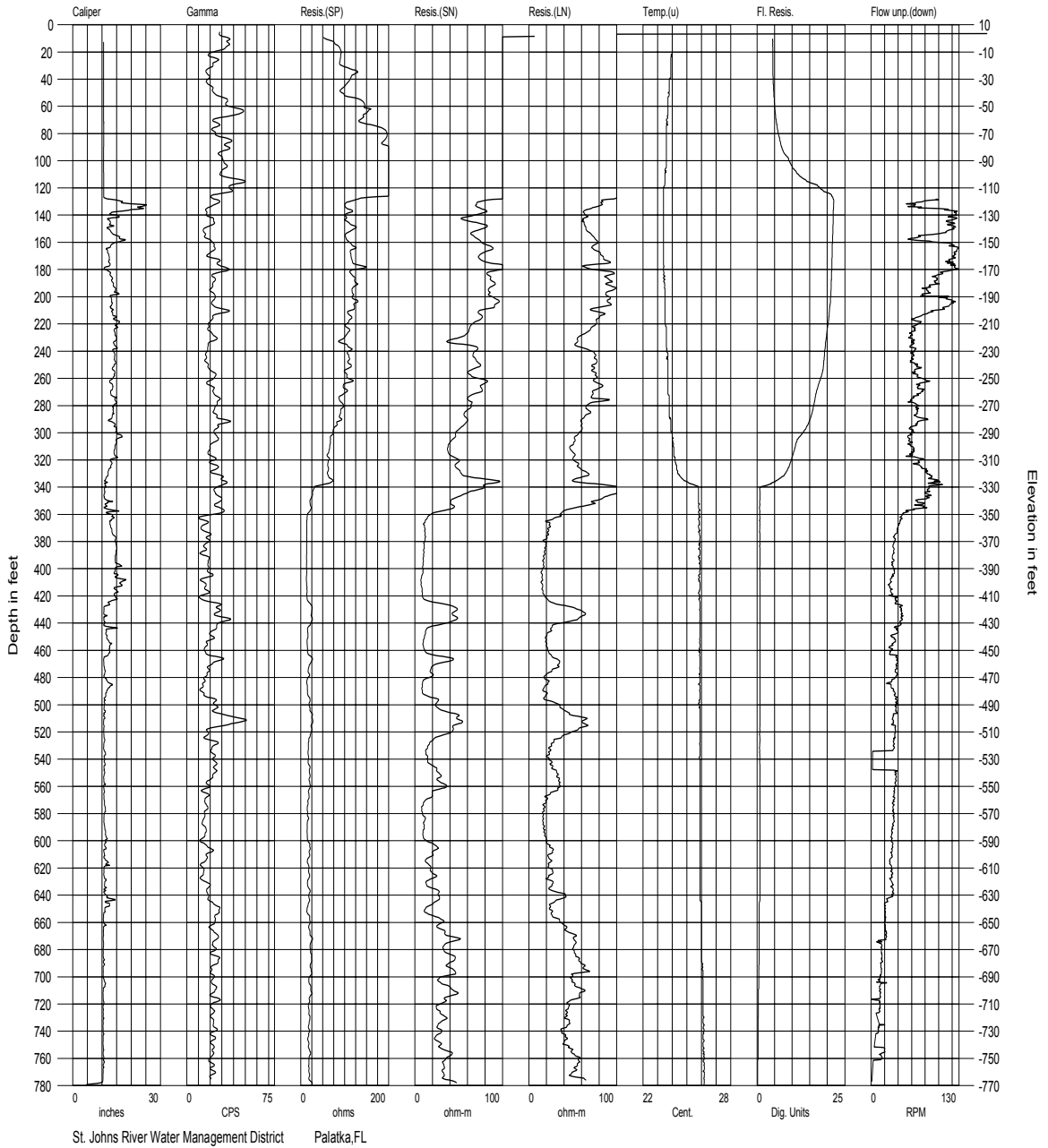


Table 13. Static Flowmeter Log

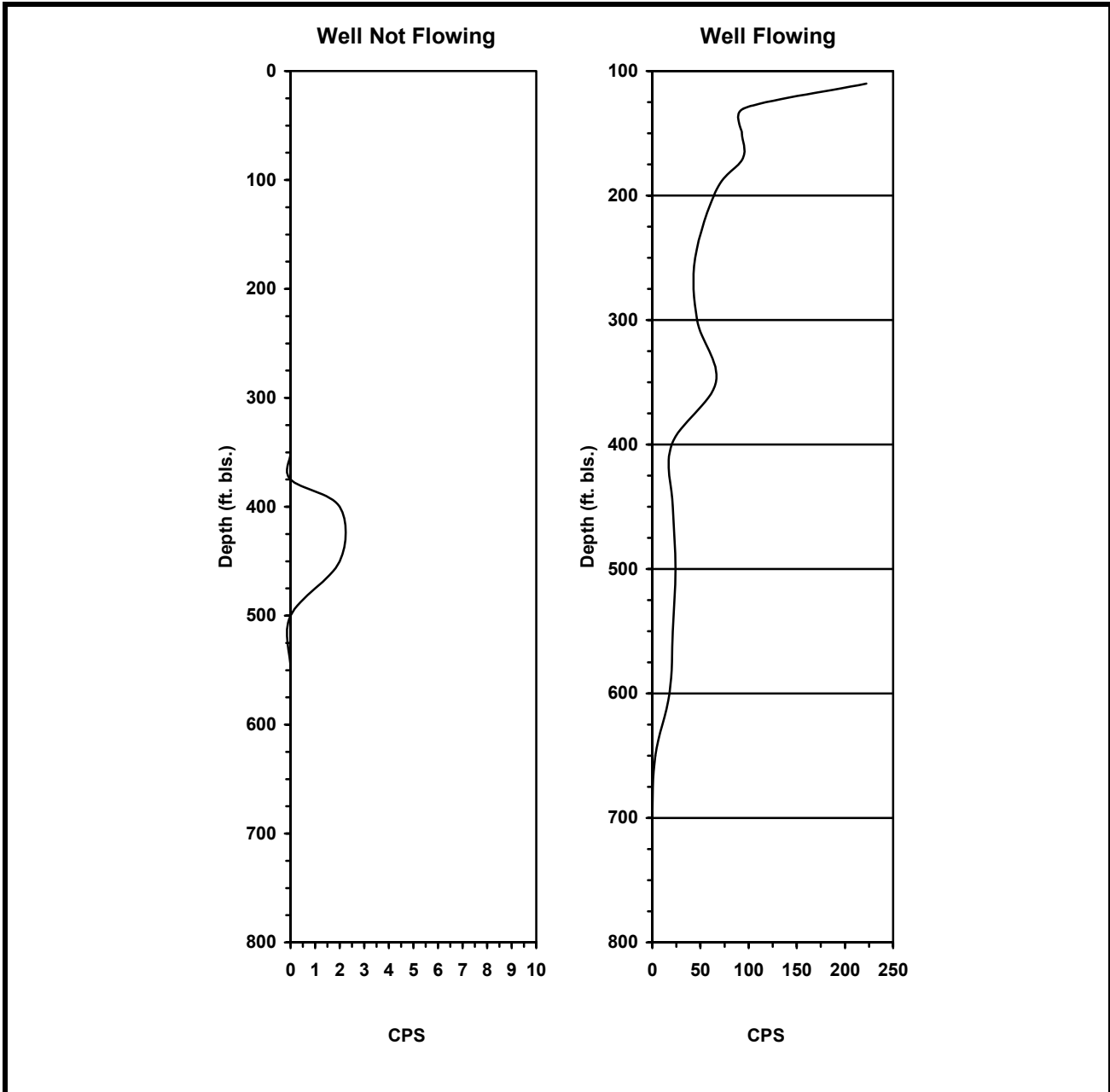
Site: Central Florida Zoo

Well Number: S-1398

Hydrologist: J. Sego

Casing Depth: 125 ft bls

Depth (ft bls)	Counts per Second	
	Well Flowing	Well Not Flowing
110	222.11	0
130	95.00	0
150	93.00	NR
170	94.00	0
195	67.00	0
200	NR	0
250	44.49	0
300	46.51	0
325	NR	0
350	66	0
375	NR	0
400	20.23	2
450	21.24	2
500	24.0	0
550	21.22	0
600	17.8	0
650	3.03	0
700	0	0
750	0	0
780	0	0



Site: Central Florida Zoo
Logger: SJRWMD
Project No: 31-58200

SJRWMD
 Figure 10. Static Flowmeter Log: Floridan Monitor Well S-1398

Geophysical Logs

Site: Central Florida Zoo

Monitor Well: S-1397 (Floridan)

Logger: SJRWMD

Date Logged: 6/15/99

