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FINAL REPORT

HYDROGRAPHIC SURVEYS
OF FOX AND SOUTH LAKES
TITUSVILLE, FLORIDA

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DISCLAIMER

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1.0 INTRODUCTION

CRA-Sunbelt Surveyors was awarded a contract to carry out a survey of South and Fox Lakes, near Titusville, Florida, in September 1989. The requirements were to place monuments at known points on the lake shores using Global Positioning System (GPS) satellites, and then to determine the water depth and the thickness of the organic sediment layer in both lakes. Preferably, automated remote sensing equipment was to be used to determine water depth and sediment thickness, and in part this project was an attempt to determine if such methods were practical in lakes of this type. However, as data were needed for restoration studies, they were to be acquired manually if necessary.

The equipment used to measure sediment thickness, Ground Penetrating Radar (GPR), was found to be ineffective in these lakes due to the unusually high conductivity of the water. The dual frequency fathometer used was unable to give valid data in shallow water (<3 to 4 feet), which was a large percentage of the lake's area. The only feasible way to get the required data was to use manual acquisition techniques.

Tests carried out with the remote sensing equipment in Sawgrass Lake showed that both remote sensing systems worked well.

Appendix A contains the detailed scope of work and subsequent agreed amendments.

A glossary of technical terms is included in section 5.0 at the end of the text.

2.0 METHODOLOGY

2.1 Horizontal Control (GPS Survey)

SJRWMD installed GPS monuments which had to be located on the shoreline of the lakes to give visibility to the sky without interference from trees and large bushes that grow right up to the lake edge. In many cases, this proved not to be on solid ground and the monuments themselves, even on top of 30 feet of metal pipe, are able to move around up to a foot or so. A few were located on dry land and still had good visibility of the sky.

Primary horizontal control for this project was taken from Florida Department of Transportation (FDOT) control established along Interstate I-95. The station names and locations are as follows (units of measurement for all coordinates quoted in this report are feet in the Florida State Plane Grid):

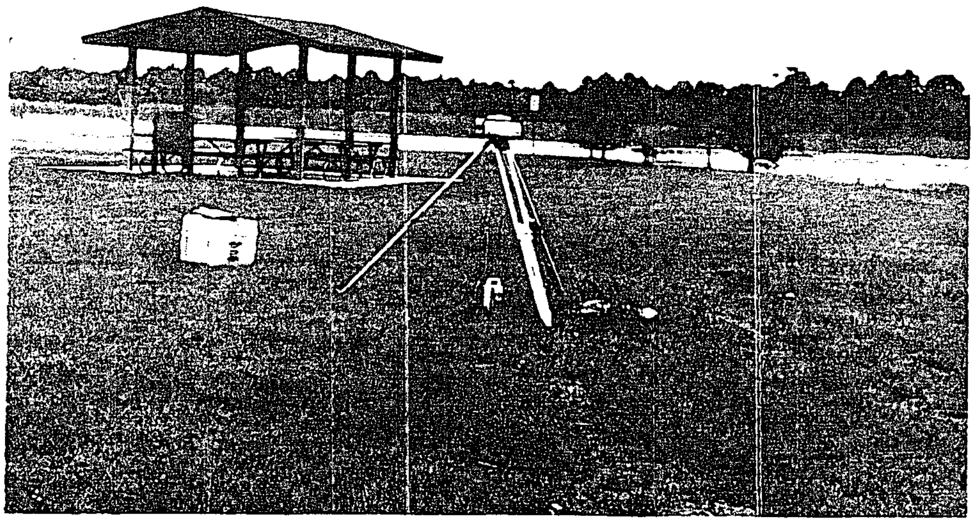
<u>South/Fox Lakes</u>

FDOT Station	X	Y	
I-95 73 B13 1973	547559.263	1558876.927	(GPS #013)

<u>Sawgrass/Hell'n Blazes Lakes</u>

FDOT Station	X	Y	
I-95 73 A52 1973	594724.287	1361233.309	(GPS #052)

Three Trimble model 4000SL receivers and one model 4000ST receiver were used for this survey. Figure 1 shows the model 4000ST set up on point FL1 (GPS #101) in Fox Lake Park (upper photograph), and on point SL3 (GPS #106) on the edge of the western extension of South Lake (lower photograph). One receiver was placed on a known point



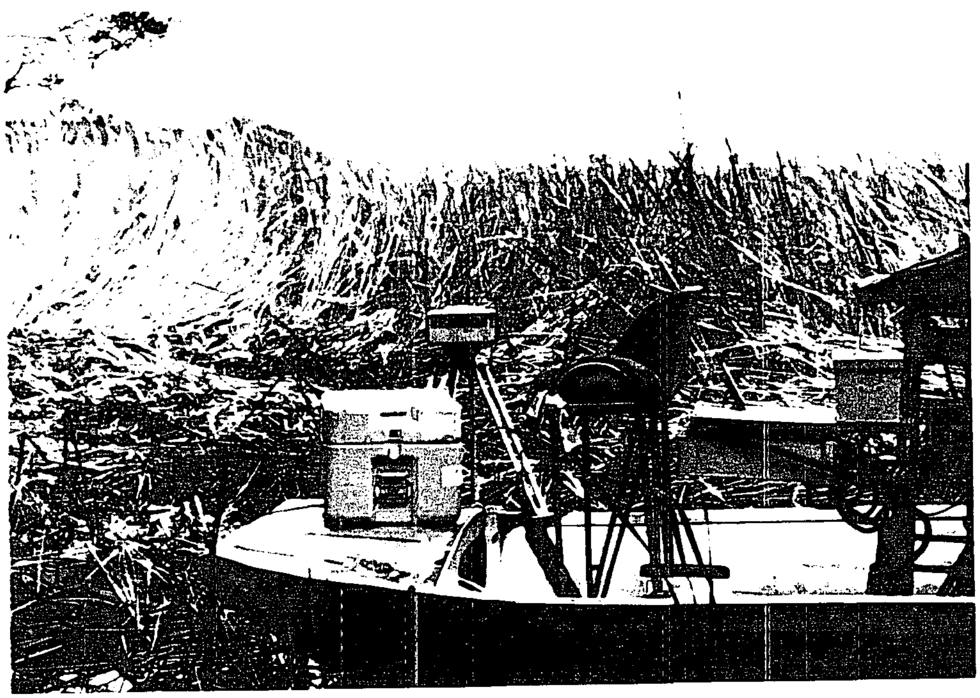


Figure 1

GPS Survey using Trimble 4000ST Unit at Sites FL1(Top) and SL3(Bottom) and the other three moved between the unknown sites, staying at each approximately two hours. By observing the same satellites at known and unknown points, inaccuracies of measurement, such as small perturbations in satellite orbit and ionospheric effects, can be determined and applied to the data, thus greatly increasing the accuracy of the results.

Appendix B contains full data on the GPS results and computations. Data are recorded on internal memory in the receivers during each observation period, and then downloaded into a Zenith laptop PC at the end of each day to be stored on magnetic disk. The PC then uses Trimble "Trimvec" software to examine, edit and process the raw data to obtain baseline distance and azimuths from the control station to the various sites. After preliminary baselines are obtained from the Trimvec software, the data are input to a second program (Geolab v 1.82S) which does a network adjustment. This process allows one point in the network to be held and to see the effect of the residual errors distributed at other points. Residual measurement errors are then distributed around the network thereby optimizing the results and giving more accurate final coordinates for the chosen sites.

2.1.1 South/Fox Lakes

The GPS survey of South and Fox lakes took place on October 9, 1989. One receiver was placed directly on FDOT control point B13 (GPS #013) on I-95 and the other units deployed on the SJRWMD monuments. Six monuments in total were to be determined (SL1,SL2B,SL3 & FL1,FL2,FL3). Figure 2 shows the location of these sites. The day was split into two observation periods with receivers occupying sites SL2B, FL2, & FL1 from 14.10 to 16.10 hours Greenwich Mean Time (GMT) and collecting data from up to seven satellites (Numbers 2,6,9,11,12,13,& 14). From 17.10 to 19.10 hours the receivers occupied sites SL1, SL3 & FL3, and collected data from up to six satellites (Numbers 3,9,11,12,13,& 14). During both observation periods all receivers collected data from a minimum of 4 to a maximum of 6 satellites simultaneously.

A convenient reference point was also established at this time for South and Fox lakes to facilitate setting positions around the lakes. To the east of I-95 and west of S.R.405 approximately 0.5 miles south of Fox Lake Road near Titusville (Section 18, Township 22 S, Range 35 E, Brevard Co.) are three radio masts, one of which is taller and stands separately. Coordinates for the tall tower were established by occupying the following FDOT control points and turning angles for a bearing:bearing intersection using a Wild T-2 theodolite:

FDOT Station	X	Y
I-95 73 B10 1973	547594.015	1538036.308
I-95 73 B11 1973	547522.575	1545452.509

The position of the Tower was calculated to be:

X	Y
548439.973	1545060.617

The final positions calculated for the sites at South and Fox Lakes are as follows (numbers in parentheses are identification numbers for the sites occupied in the GPS survey):

South Lake Stations	X	Y
SL1 (104)	543190.132	1561345.439
SL2B (103)	543482.692	1555250.149
SL3 (106)	538166.645	1549976.473

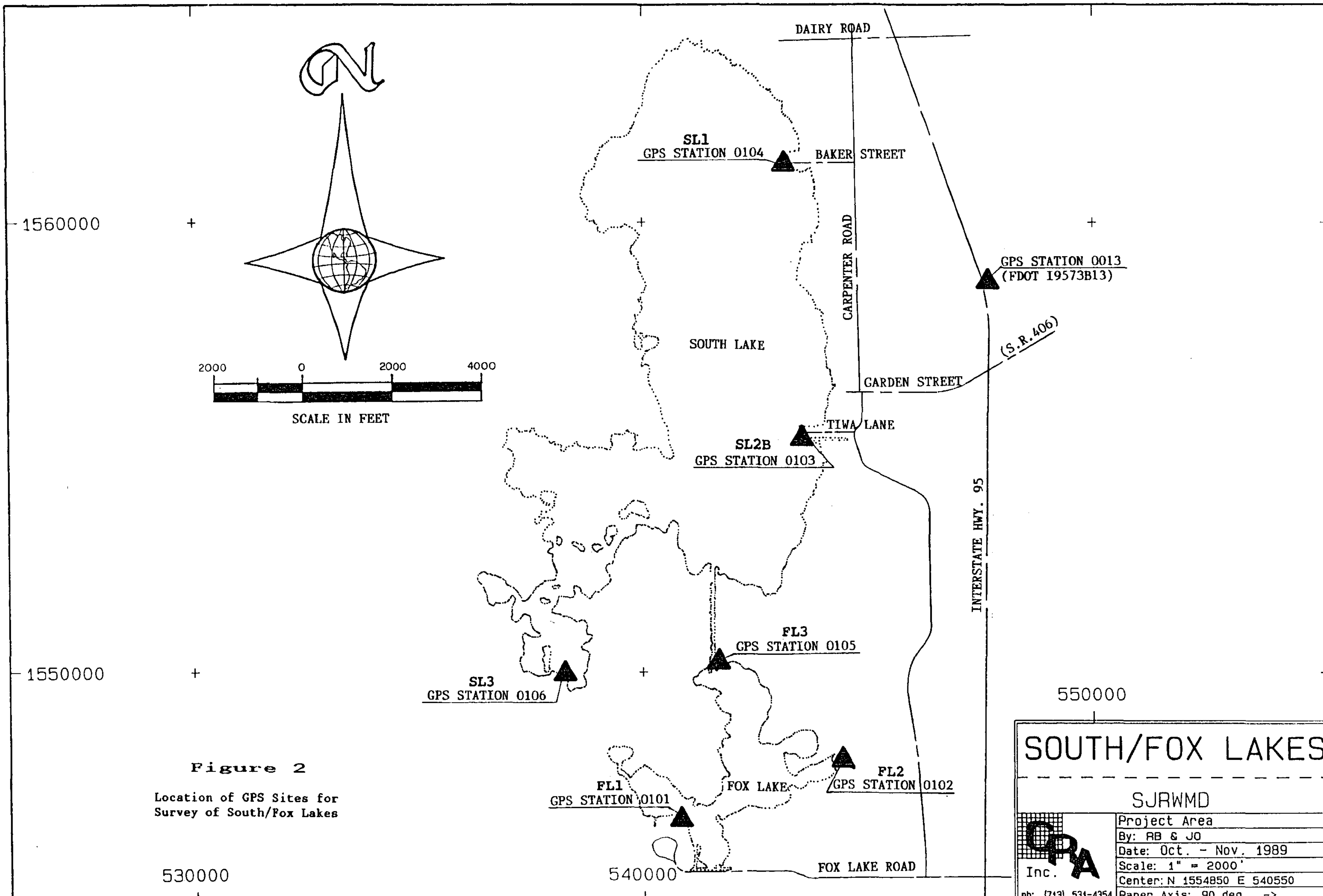


Figure 2

Location of GPS Sites for Survey of South/Fox Lakes

Fox Lake Stations	X	Y
FL1 (101)	540955.157	1546651.570
FL2 (102)	543926.063	1548586.884
FL3 (105)	541664.505	1550161.243

The Geolab output included in Appendix B shows error ellipse data tables for all sites. In the worst case, these ellipsoids have axes less than 0.05 meters (2 inches) at the 95% confidence level.

During the survey at South and Fox lakes two of these baselines were measured with a conventional Electronic Distance Meter or EDM (Geodimeter 112) as an approximate check for quality control purposes. To see over vegetation a 30 foot prism pole was used at one end. As a result, these measurements are not quite as accurate as those from the GPS survey. The baseline results are as follows:

Baseline	GPS Distance	EDM Distance
FL1 - FL2	3546.35 ft	3546.10 ft.
SL2B - SL1	6102.31 ft	6102.37 ft.*

* This measurement is a composite of two measured ranges to avoid a tree on-line between the two GPS sites.

2.1.2 Lakes Sawgrass and Hell'n Blazes

Fieldwork on lakes Sawgrass and Hell'n Blazes was undertaken on October 10, 1989. One receiver was placed on FDOT monument A52 (GPS #052) which was the control site. This station is located six miles west of Melbourne and about eight miles south-southeast of Palm Shores at the intersection of U.S. route 192 and Interstate 95 (Section 3, Township 28 S, Range 35 E, Brevard Co.). Again six sites (total) were occupied in two observation periods. The first from 14.05 to 16.05 hours (GMT) collecting data from satellites numbers 2,6,9,11,12,13,and 14 at sites HB1, HB2, HB3, on Lake Hell'n Blazes, and the second from 17.05 to 19.05 hours (GMT) collecting data from satellites numbers 3,9,11,12,13,and 14 from sites SA1, SA2, and SA3 on the Sawgrass Lakes (Figure 3).

After processing, the final adjusted positions for the sites are as follows (GPS survey reference numbers are in parentheses).

Hell'n Blazes Stations	X	Y
HB1 (301)	566071.393	1336254.178
HB2 (302)	566823.286	1340765.880
HB3 (303)	564841.347	1342139.893

Sawgrass Lake Stations	X	Y
SA1 (401)	567927.559	1355520.192
SA2 (402)	570083.227	1357578.242
SA3 (403)	573029.719	1361522.000

Statistical output from the Geolab program again shows axes for the error ellipses to be less than 0.05 meters (2 inches) at the 95% confidence level.

As no hydrographic survey work was to be carried out on these lakes, no baseline checks with an EDM were made.

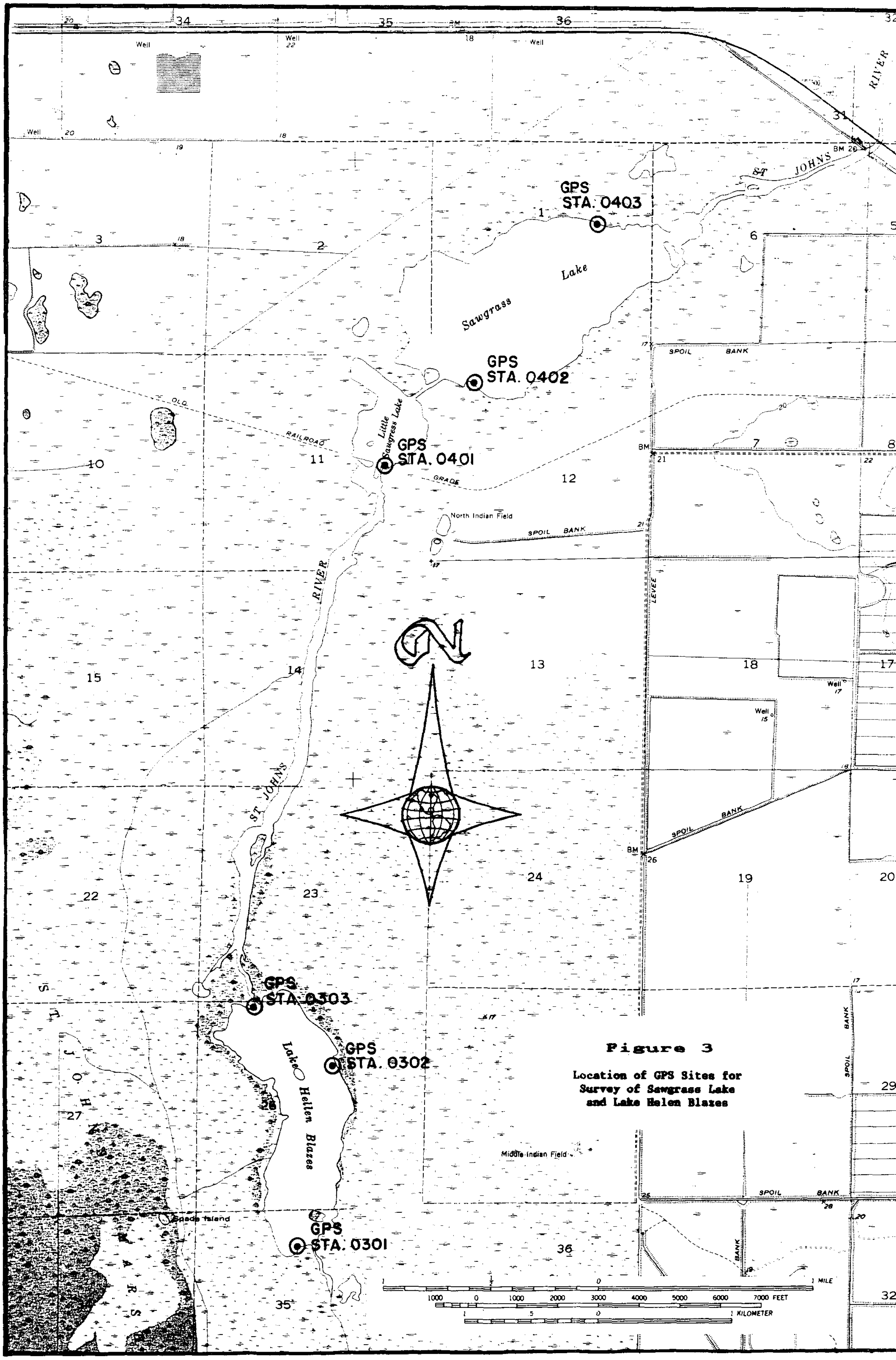


Figure 3

Location of GPS Sites for Survey of Sawgrass Lake and Lake Helen Blazes

2.2 Vertical Control

The sites for the two water level recorders were on a wooden pier close to GPS station SL2B at the Tiwa Lane cul-de-sac on South Lake, and at the boat ramp in Fox Lake Park. For the former site, vertical control was originally run in from a City of Titusville benchmark on Carpenter Road near the junction with Tiwa Lane. Prior to starting hydrographic data acquisition, a check of water elevations at both sites revealed an error in the City of Titusville benchmark. A three wire level loop was run in from existing FDOT control using the Wild NA-2 level. For South Lake the FDOT control point on I-95 # B13 (see section 2.1.1 above) was used as the origin, which has a published elevation of + 36.619 feet, National Geodetic Vertical Datum (NGVD), 1929 adjustment. An elevation was put on both GPS point SL2B (+ 19.497 feet NGVD) and the dock piling on which the water level recorder was situated. For Fox Lake, the origin was taken from FDOT point # B11 (see section 2.1.1) which has a published elevation of + 42.929 feet NGVD, and an elevation run to GPS point FL1 (+ 16.578 feet NGVD), and a nail on top of the north-east most pile of the wooden dock at the Fox Lake Park boat ramp (+ 18.815 feet NGVD), close to the actual location of the water level recorder for this survey. Appendix C contains copies of published FDOT precise levelling data and Appendix D contains copies of original field notes for both horizontal and vertical control.

The water level recorders were two Stevens Type F model 68 units which record for up to a week on a paper drum chart. Copies of records from these units are included in Appendix E. Every day during hydrographic data collection, the recorders were annotated with reference to a staff installed next to the recorder. This served as a check on the recorder to ensure that they had not gone out of adjustment. Table 1 shows a tabulation of the daily annotations for each gauge.

2.3 Hydrographic Survey

An airboat was used to conduct this survey because of the high concentration of emergent vegetation in these lakes. Figure 4 shows photographs of typical weed concentrations along the lake shoreline. A 16 foot fiberglass hull airboat was outfitted with fabricated wooden boxes to house the computer system and the GPR console and fathometer. A mount was made to suspend the fathometer transducer over the port side, close to a telescopic pole on which was located the prism array and the telemetry receiver. Figure 5 shows photographs of the airboat and the equipment installation.

SJRWMD agreed to digitize what was to be referred to as the "shoreline" of both lakes from existing 1987 aerial photographs, and to provide the data to Sunbelt on IBM PC compatible disk in ASCII format. It was realized that this may not accurately reflect the present day shoreline, but it was to be accepted as the basis to plan survey lines. Figure 6 shows a map of the digitized lake shoreline and the planned survey lines every 500 feet running east-west which was submitted to SJRWMD and approved on October 11, 1989. In practice, due to the thick emergent vegetation around the shoreline, it was sometimes not possible to reach the desired end-of-line. Figure 7 shows the actual lines that were run and their extent, with regard to the digitized shoreline. The proposed and actual start and end of line coordinates are contained in Appendix F. Appendix G contains summary daily logs.

2.3.1 Lasertrak

The "Lasertrak" is a new and unique range:azimuth positioning system which operates similarly to a land survey total station, but which has been designed specifically for hydrographic applications (Appendix H). The operator tracks a prism array on the vessel through the telescope and the Lasertrak measures slope range (+/- 1 foot), horizontal angle (+/- 0.01 degrees) and vertical angle (+/-0.1 degrees) twice per second, then transfers the data via a radiotelemetry link to the computer on the airboat. The system is set up on a known point and the telescope sighted on another point to which the grid azimuth is known. This azimuth is then entered

WATER LEVEL READINGS

	South Lake		Fox Lake		
Date	Time	Elevation (E1)	Time	Elevation (E2)	(E1)-(E2)
15-Oct	16:10	15.53	18:20	15.59	-0.06
16-Oct	09:10	15.52	13:00	15.58	-0.06
17-Oct	07:45	15.51	07:30	15.56	-0.05
18-Oct	08:30	15.55	08:45	15.58	-0.03
19-Oct	08:00	15.54	09:00	15.58	-0.04
20-Oct	14:00	15.55	13:50	15.60	-0.05
23-Oct	12:30	15.46	11:00	15.51	-0.05
24-Oct	09:30	15.45	08:20	15.50	-0.05
25-Oct	18:00	15.48	10:00	15.54	-0.06
26-Oct	12:50	15.50	08:00	15.55	-0.05
27-Oct	16:52	15.57	07:45	15.63	-0.06
28-Oct	07:56	15.60	08:49	15.66	-0.06
29-Oct	10:00	15.62	08:00	15.68	-0.06
30-Oct	07:30	15.68	08:15	15.72	-0.04
31-Oct	09:05	15.66	08:45	15.71	-0.05
01-Nov	12:10	15.66	07:30	15.71	-0.05
02-Nov	07:40	15.65	08:30	15.70	-0.05
03-Nov	07:40	15.65	08:00	15.70	-0.05
04-Nov	07:30	15.64	07:50	15.69	-0.05
05-Nov	07:35	15.63	08:15	15.68	-0.05
06-Nov	14:00	15.62	13:20	15.67	-0.05
					========
				AVG	-0.05

Table 1

Tabulation of Water Level Readings During Fieldwork

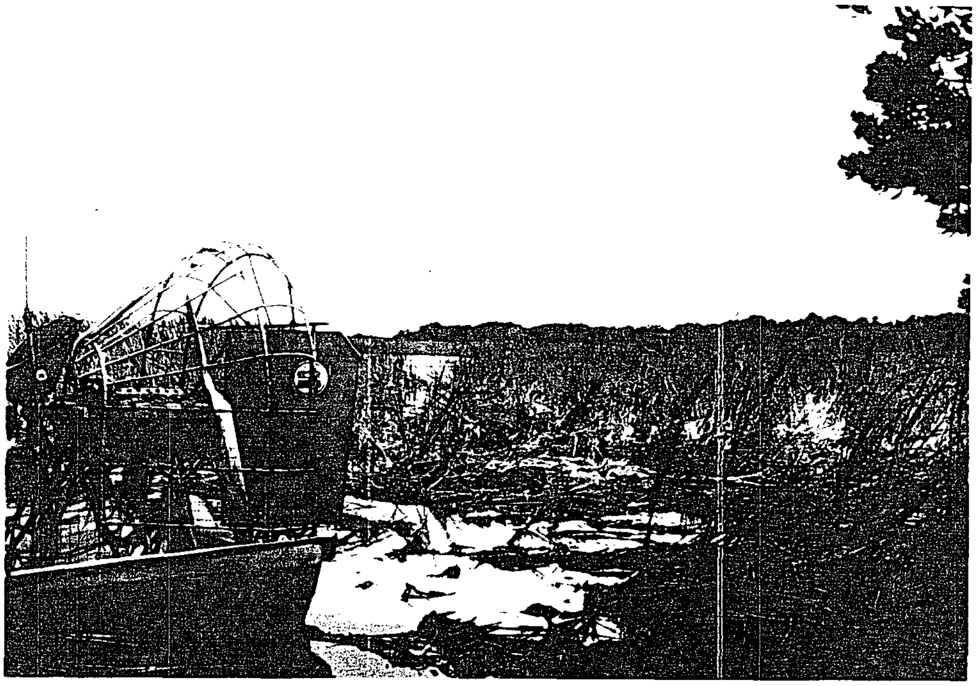


Figure 4

Concentration of Thick Cattails Along Shoreline of South Lake

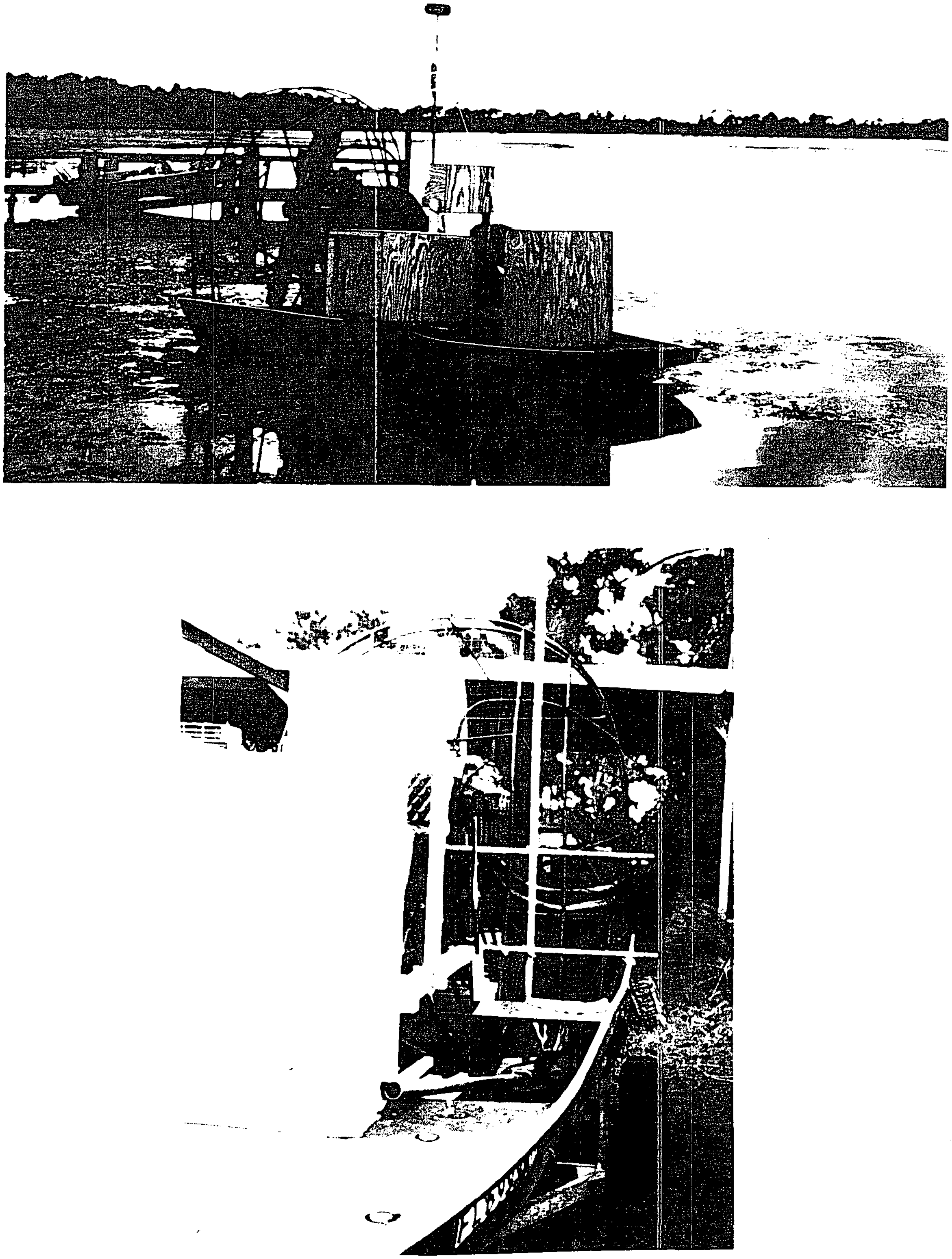


Figure 5

Survey Airboat Showing Special Housings for Hydrographic Equipment

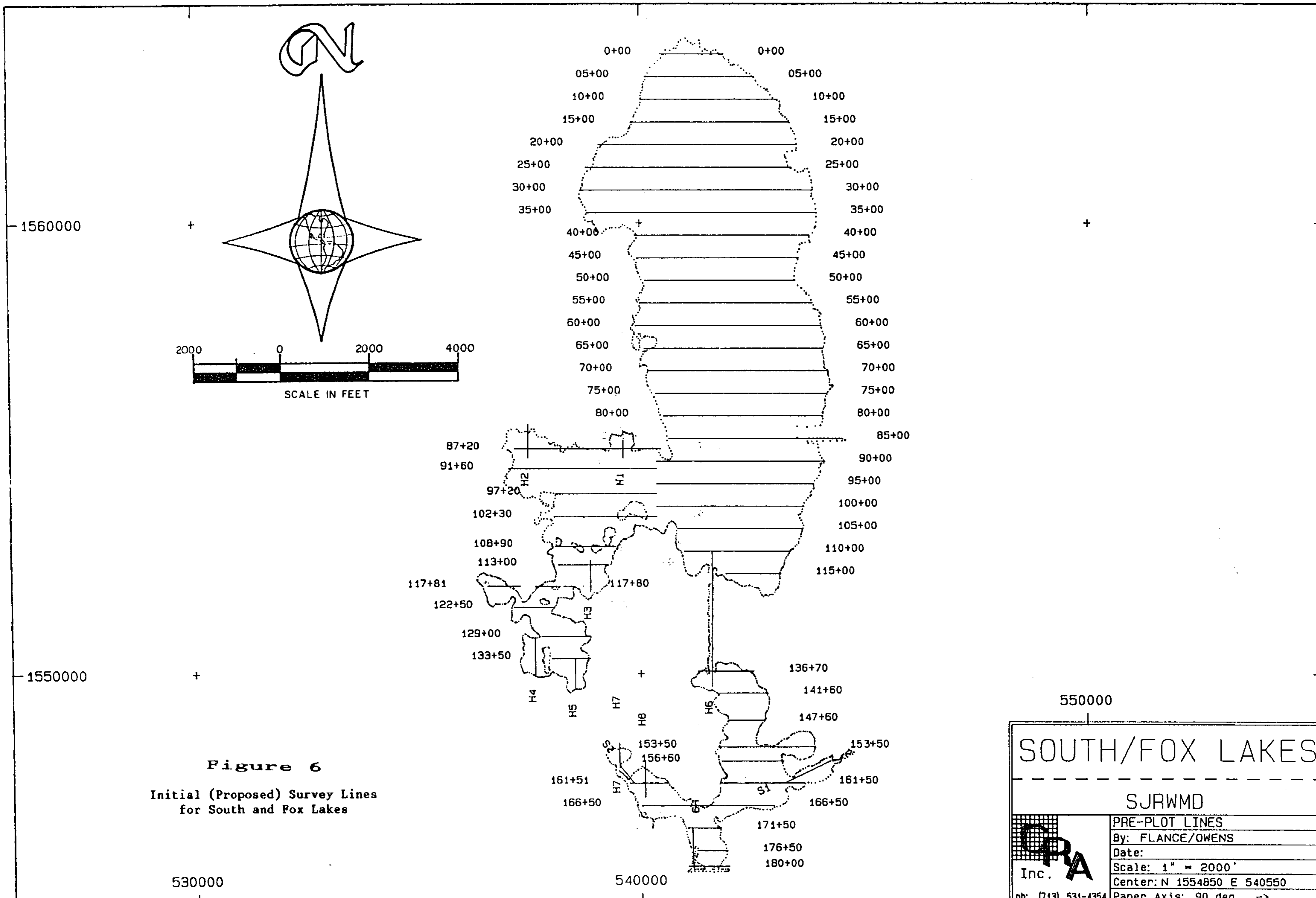


Figure 6

Initial (Proposed) Survey Lines
for South and Fox Lakes

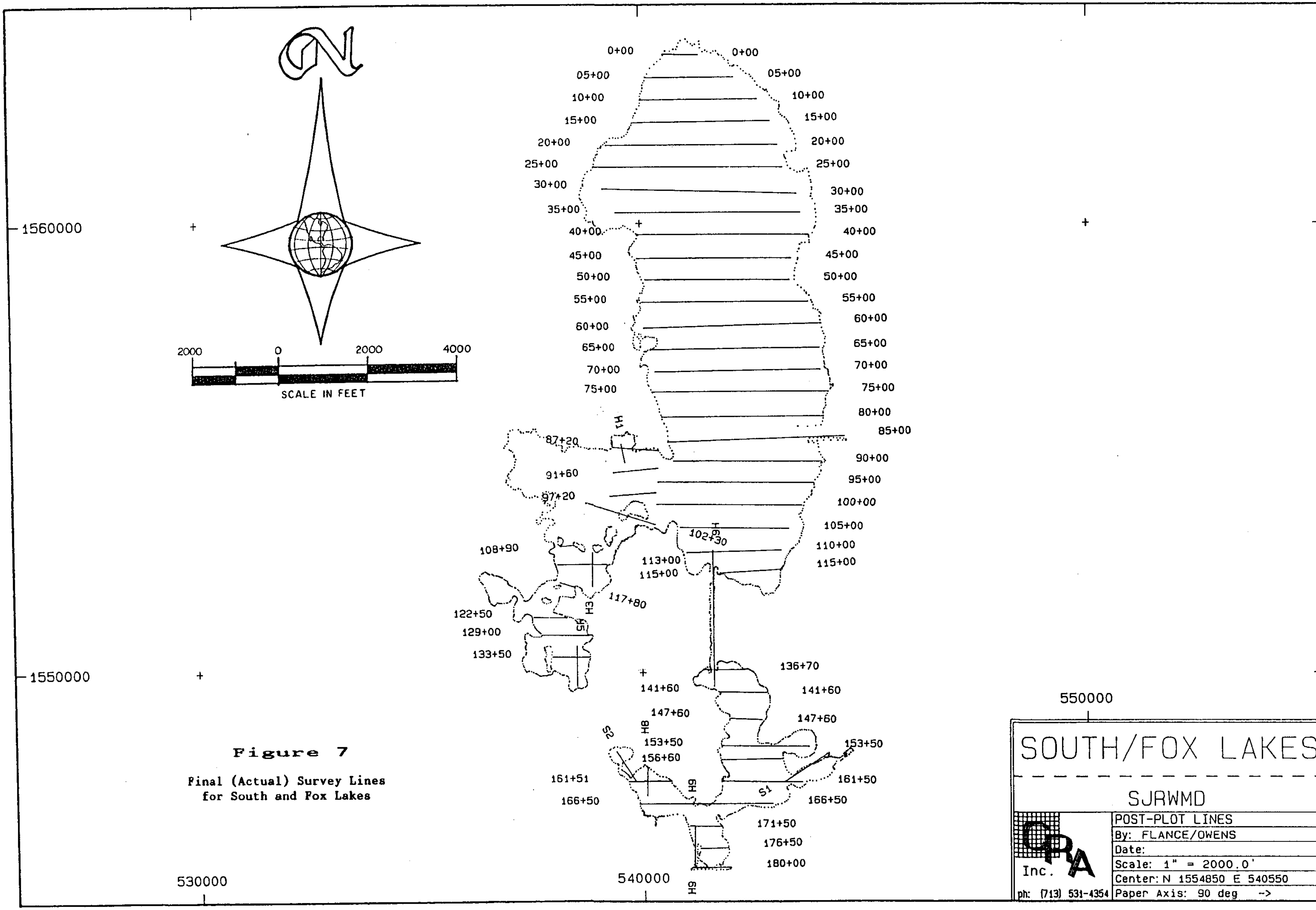


Figure 7

Final (Actual) Survey Lines for South and Fox Lakes into the Lasertrak which, from then on, outputs the horizontal angle to the target as a grid azimuth. Unlike normal land survey total stations, the Lasertrak can control a survey over a large area (up to 2.5 miles) from a single setup point.

The primary horizontal control points set with GPS, together with the tall radio mast (see section 2.2.1) were used to set a number of eccentric points designed to have maximum visibility of the entire lake area from a minimum number of points. These points were determined using a Topcon GTS-2 total station instead of the Lasertrak itself, to give increased accuracy in their final positions. In some cases, it was possible to set up directly over the GPS monument and an eccentric point was not necessary. In all, a total of 10 Lasertrak locations were used, the coordinates of which are shown below and on a chart in Figure 8.

	X	Y
1) SL2B	543482.69	1555250.15
2) SL2A	543486.96	1555497.26
3) SL1*	543190.13	1561345.44
4) N. Fox Lake*	541644.50	1550161.20
5) C. Fox Lake*	542174.70	1548668.90
6) FL1	540955.16	1546651.57
7) S. Fox Lake	541119.78	1545593.12
8) S.W.South Lake*	539267.60	1553612.50
9) S.W.South Lake*	538570.70	1552379.70
10)S.W.South Lake*	538028.40	1551043.40

Lasertrak points marked with an asterix (*) were located in the lake which required the construction of towers. Figure 9 shows the method used to construct these towers. A number of 2 inch by 4 inch wood house studs each 16 feet in length were driven into the mud from an airboat to leave 3 to 4 feet (average) sticking out of the water. These uprights were then braced together to form a base for the aluminum tower supplied by SJRWMD. Sheets of 3/4 inch plywood were used to make a floor on the tower on which stood the Lasertrak tripod and operator. The aluminum tower was transported to the wood base on the front end of an airboat, or using a 12 foot aluminum flat bottomed boat. The construction of these towers was one of the most time consuming phases of the work, but the design proved effective and could be repeated on other lakes. On completion of this project, these tower bases were left standing.

2.3.2 Automated Data Acquisition System

A Hewlett Packard 9816 computer, peripherals and software specially developed by CRA Inc. for hydrographic surveys was used for automated data acquisition. Programs and data were stored on 3 1/2 inch floppy disk on an HP 9121 dual disk drive. A hard copy of the position data was printed out on a Hewlett Packard "Thinkjet" printer. Figure 10 shows the computer system installed on the airboat.

The software takes the position data from the Lasertrak and computes vessel position in x,y coordinates at selectable intervals (commonly every 2 seconds) which are then used to provide a graphic indication of vessel position with respect to pre-programmed survey lines. The information displayed also includes fix number, vessel speed, course, water depth, x,y coordinates, time, filter settings, offtrack and downline distance. Data were printed out and stored on disk every five seconds.

2.3.3 Ground Penetrating Radar (GPR)

Ground Penetrating Radar (GPR) is a relatively recent technique of exploiting the contrasts in electrical conductivity between various sediment and rock formations, as well as man made objects (pipelines, etc.).

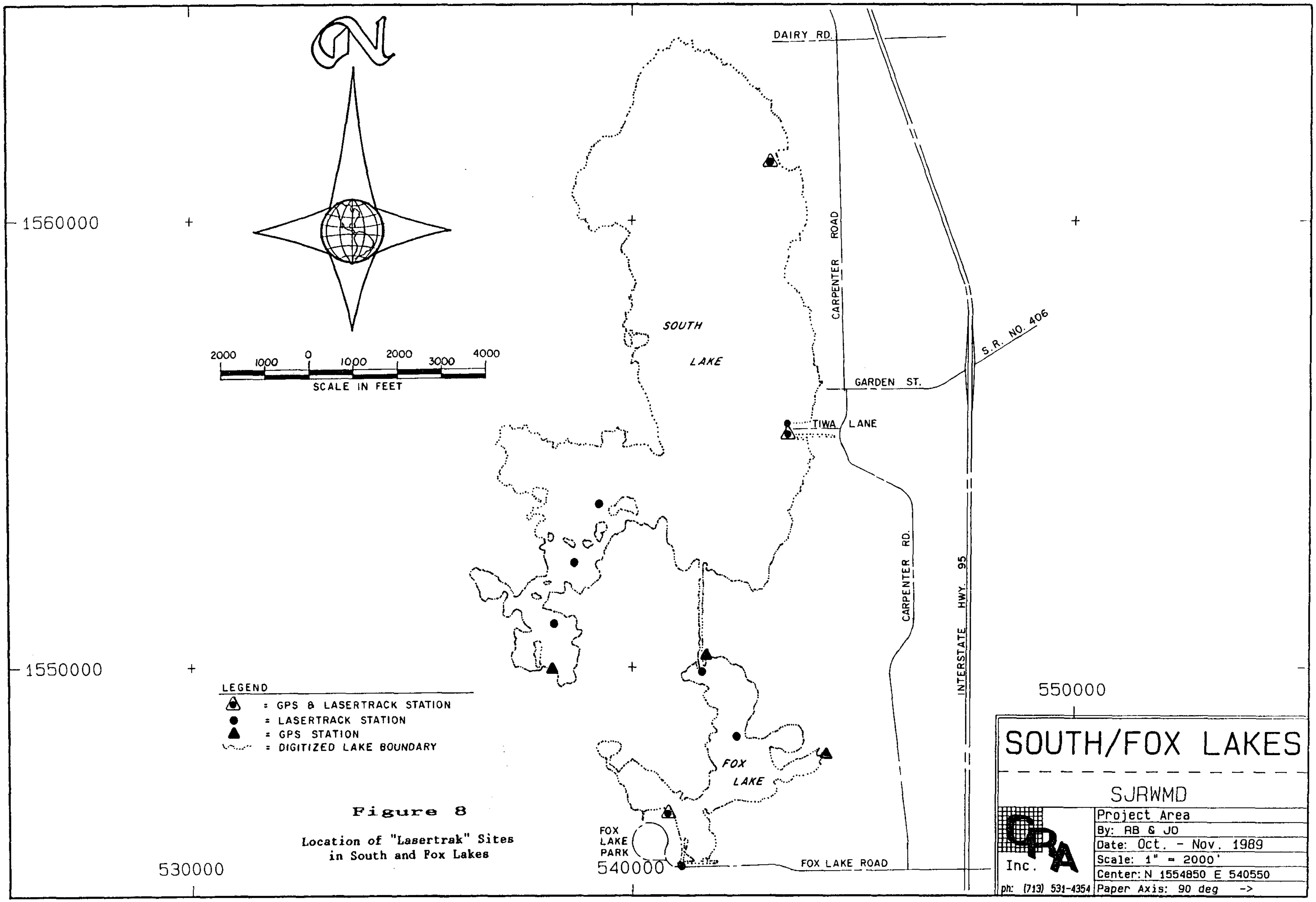
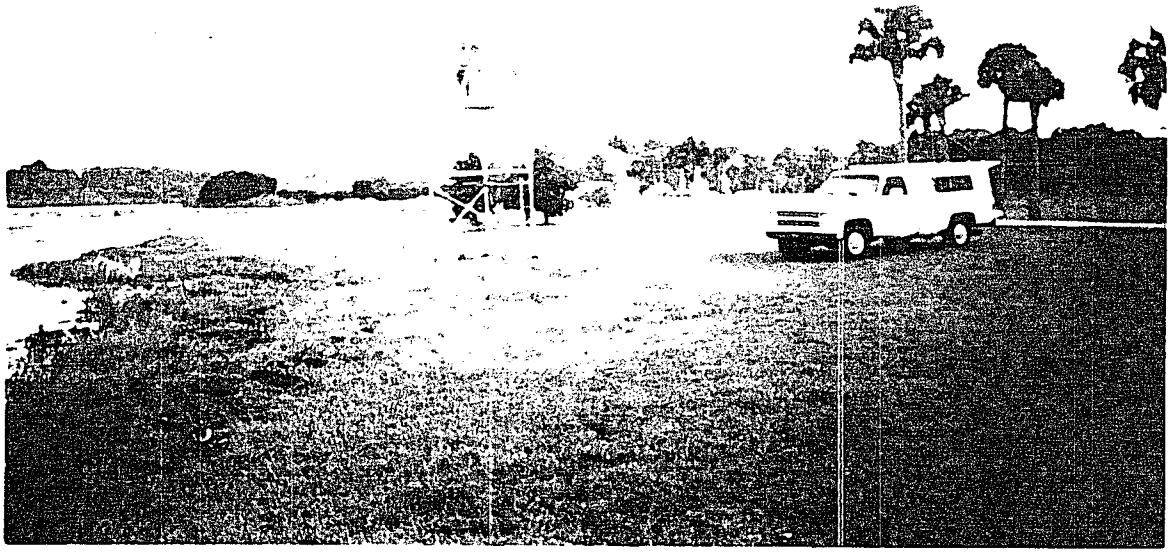


Figure 8

Location of "Lasertrak" Sites in South and Fox Lakes



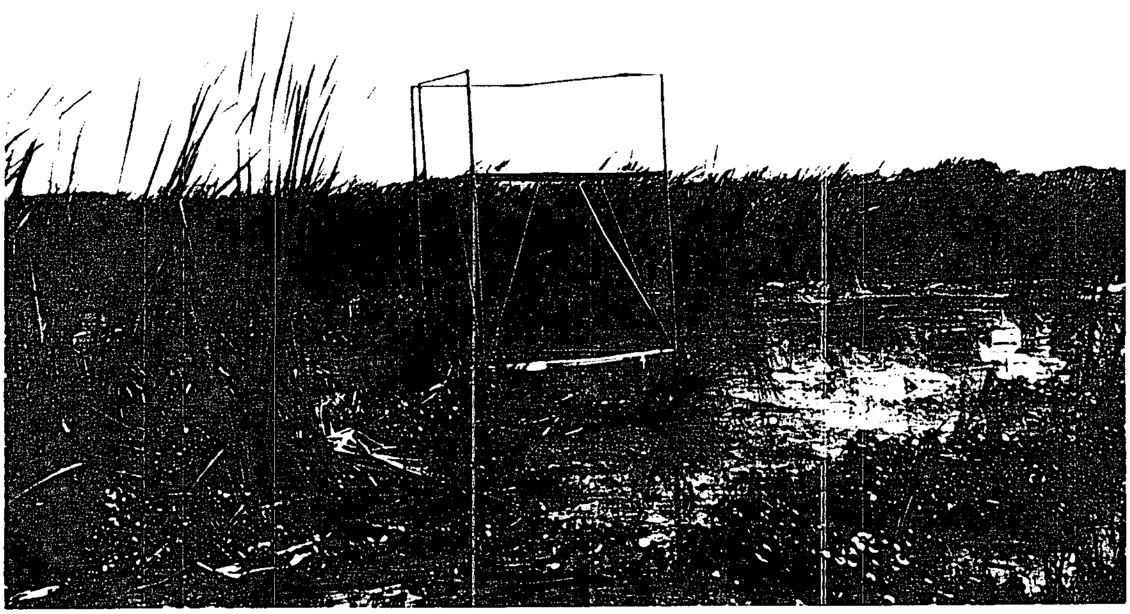


Figure 9

Aluminum Survey Tower at Fox Lake(Top) and on Pilings in South Lake(Bottom)

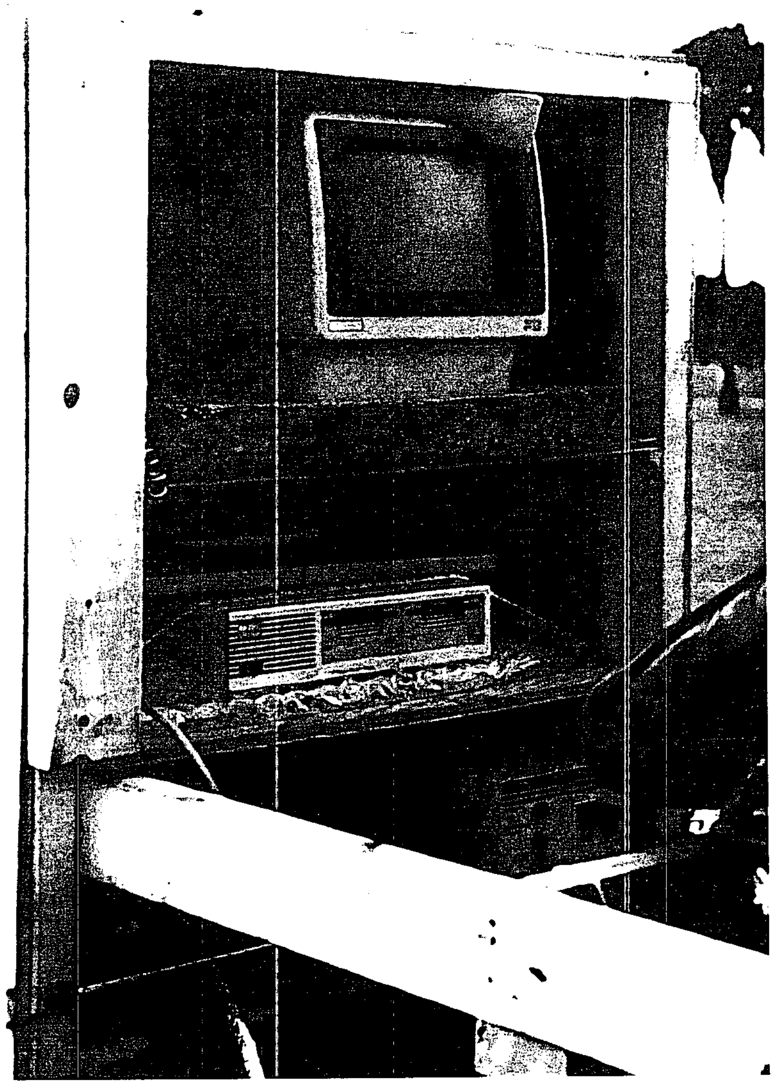


Figure 10

Computer System Installed on Survey Airboat

The GPR system consists of an antenna that is moved along the desired trackline and which is connected to the main console via umbilical cable. In water work this usually means placing the antenna in a small dingy, or floating it directly on the surface of the water. Figure 11 shows the deployment of the GPR equipment on the airboat and a record obtained in Sawgrass Lake.

The antenna transmits and receives radar impulses reflected from subsurface soil horizons or interfaces, as well as discrete targets or individual objects. These reflected pulses are sent to the processor, and the display recorder, where a graphic representation is immediately produced of subsurface features. Since the radar pulses are transmitted and received at a very high rate (16 pulses per second), the displayed data represent a continuous subsurface profile, or cross-sectional view, of the soil layers along the trackline. This produces a datum point every 4 to 12 inches across the ground, depending on the rate of travel. The depth of penetration, as well as the amount of radar energy reflected, depends on the electrical properties of the media through which the energy travels (conductivity and the dielectric constant). In general, the electrical properties are determined by the mineral and chemical constituents in the ground water and the soils themselves. Highly conductive soils, such as moist clay, limit penetration to a few feet, whereas in coarse sands and gravels, penetration of 40 to 60 feet are not uncommon. In fresh water lakes and rivers with silt or sand bottoms, penetrations of 20 to 30 feet may be expected. Using the GPR data it is possible to map the lateral extent of soil horizons, although identification of the soil requires a physical sample. The GPR technique is also useful for locating and mapping subsurface utilities, voids, etc.

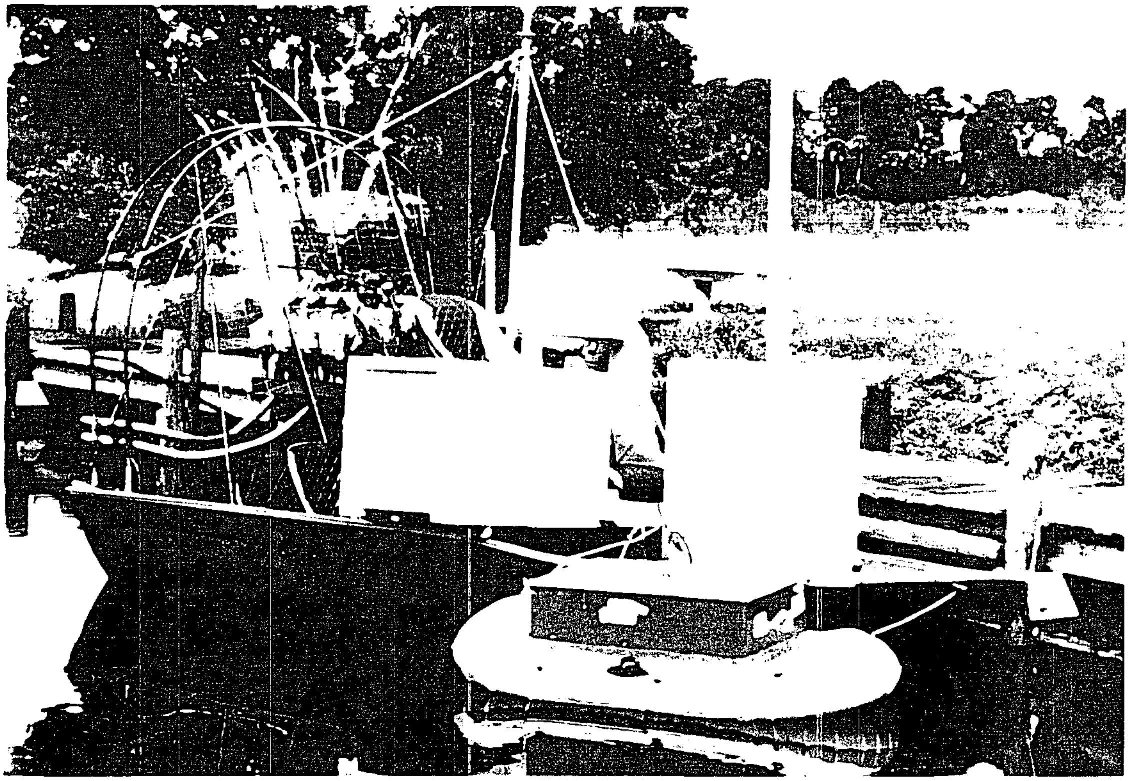
During the period October 16th and 17th, the survey airboat was able to conduct extensive tests of the GPR system. Tests in South and Fox Lakes proved that penetration was extremely limited. Figure 12 shows an extract from one of the records taken in South Lake over the one "deep" spot just off the Tiwa Lane cul-de-sac. The horizontal lines superimposed on the records represent distances of 1.5 feet vertically. The lake floor can be seen on the records where it is close to the water surface, but when the water depth increases to only 3 feet, the return is lost and horizontal bands of noise is all that can be seen. Subsequently it was confirmed by SJRWMD that the water chemistry of South and Fox Lakes does show a relatively high level of conductivity which causes the radar energy to be dissipated away through the water.

Lower water conductivity at Sawgrass Lake during tests on October 17th gave a clear picture of both the lake bottom and the sediment layer in water up to 6 feet deep. Both records shown in Figures 13 and 14 allow measurement of the thickness and lateral extent of the sediment layer. The records show the sediment thickness on the two records to vary between 2 and 3 feet. A rod was pushed through the soil layer to confirm that the bottom layer seen was in fact the hard sand.

However data from South and Fox Lakes were not useful enough to justify the cost and manual probing was used to obtain data on the thickness of the sediment layer.

2.3.4 Fathometer

The fathometer used was an Innerspace model 440, dual frequency unit working at frequencies of 40 and 210 kHz (See Figure 15). The second, lower frequency, gives the best chance of penetrating the vegetation in the water column and on the lake floor. However, resolution (accuracy) falls off with decreasing frequency, and the longer pulse lengths associated with lower frequencies, increases the minimum water depth in which measurements can be made. This unit had been modified by the manufacturer to get the low frequency to read depths in shallower water than is normally possible.



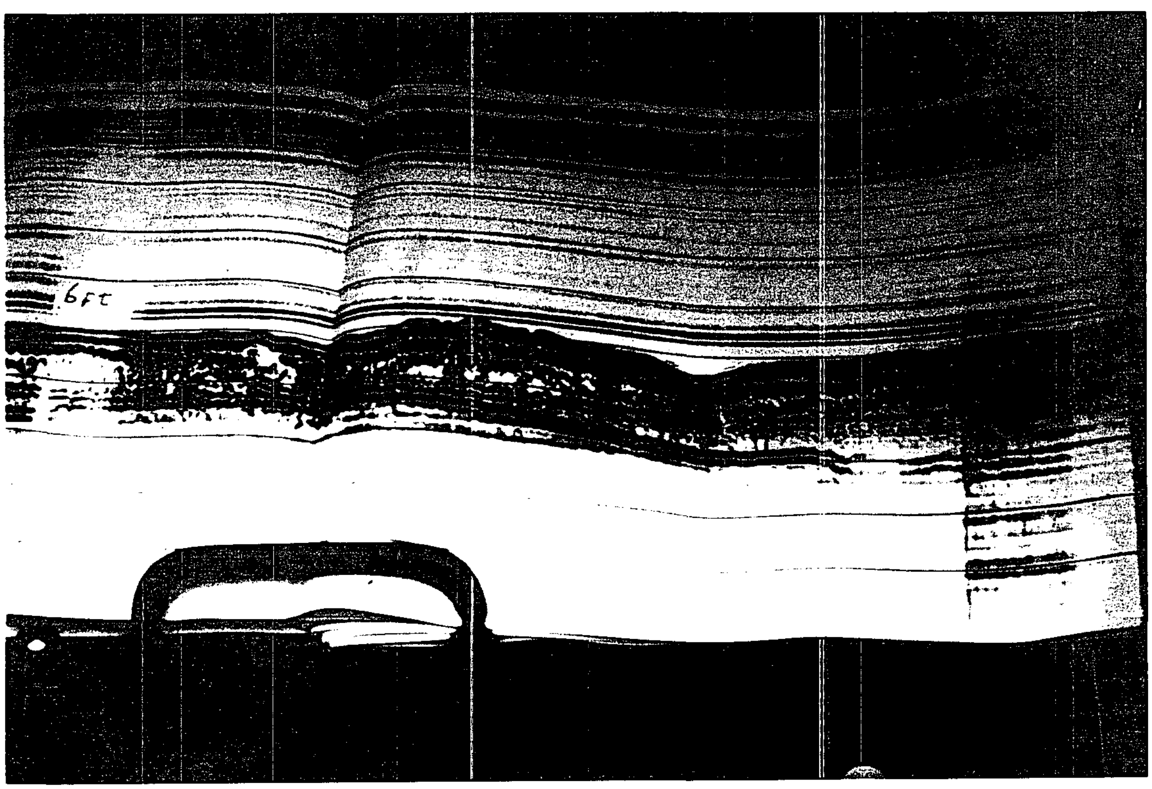


Figure 11

GPR Antenna Deployed from Airboat(Top) and Sample Record from Sawgrass Lake

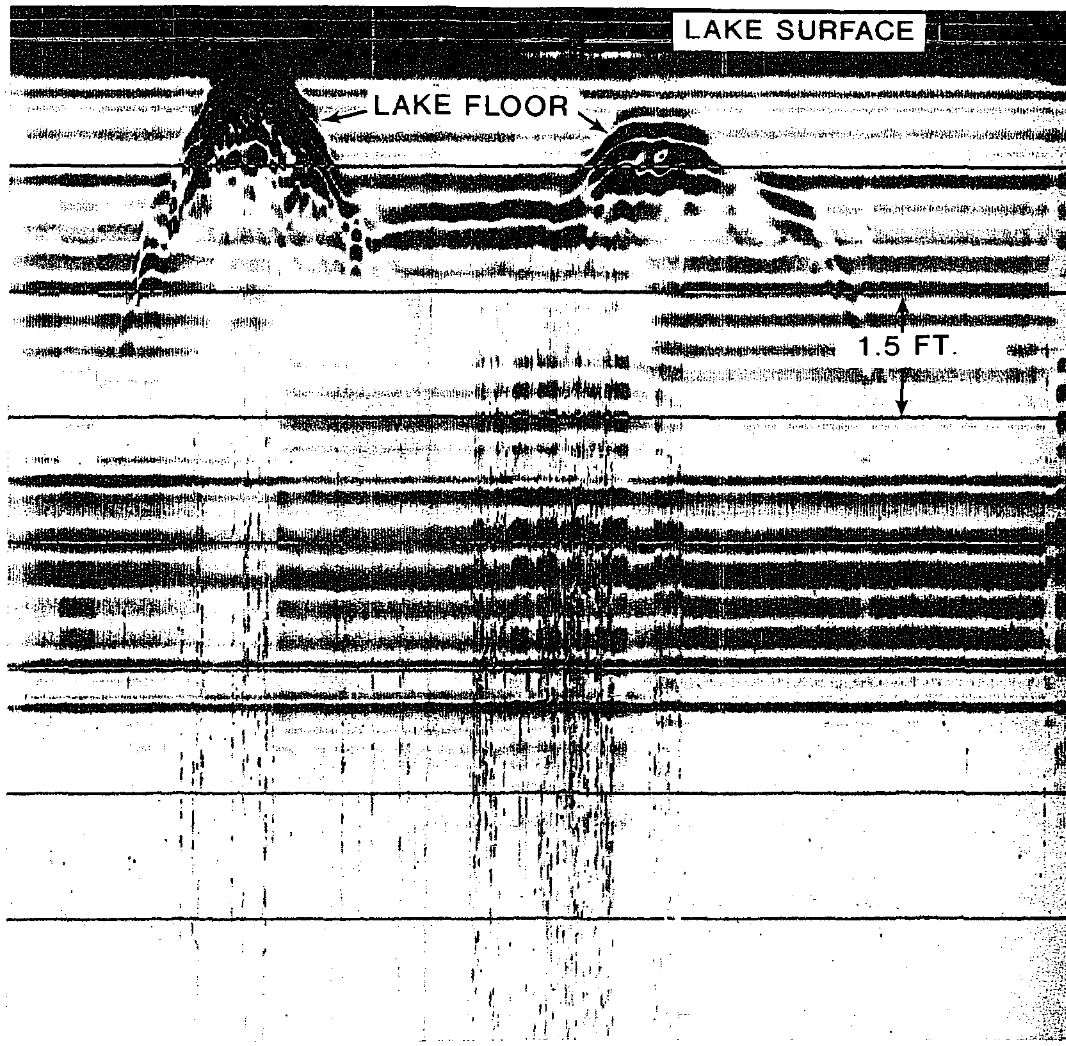


Figure 12

Sample GPR Record from South Lake

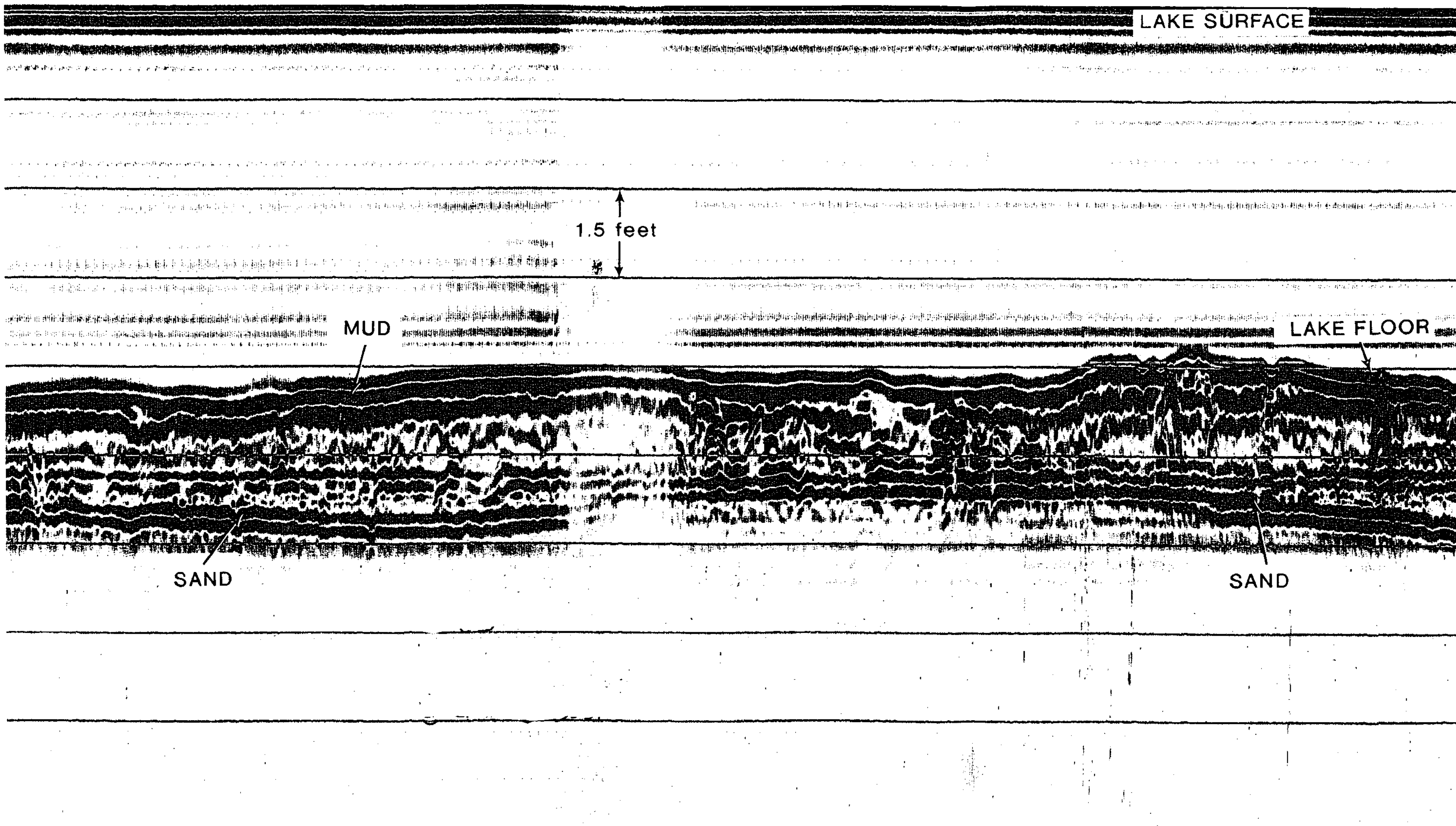


Figure 13

Sample GPR Record From Sawgrass Lake

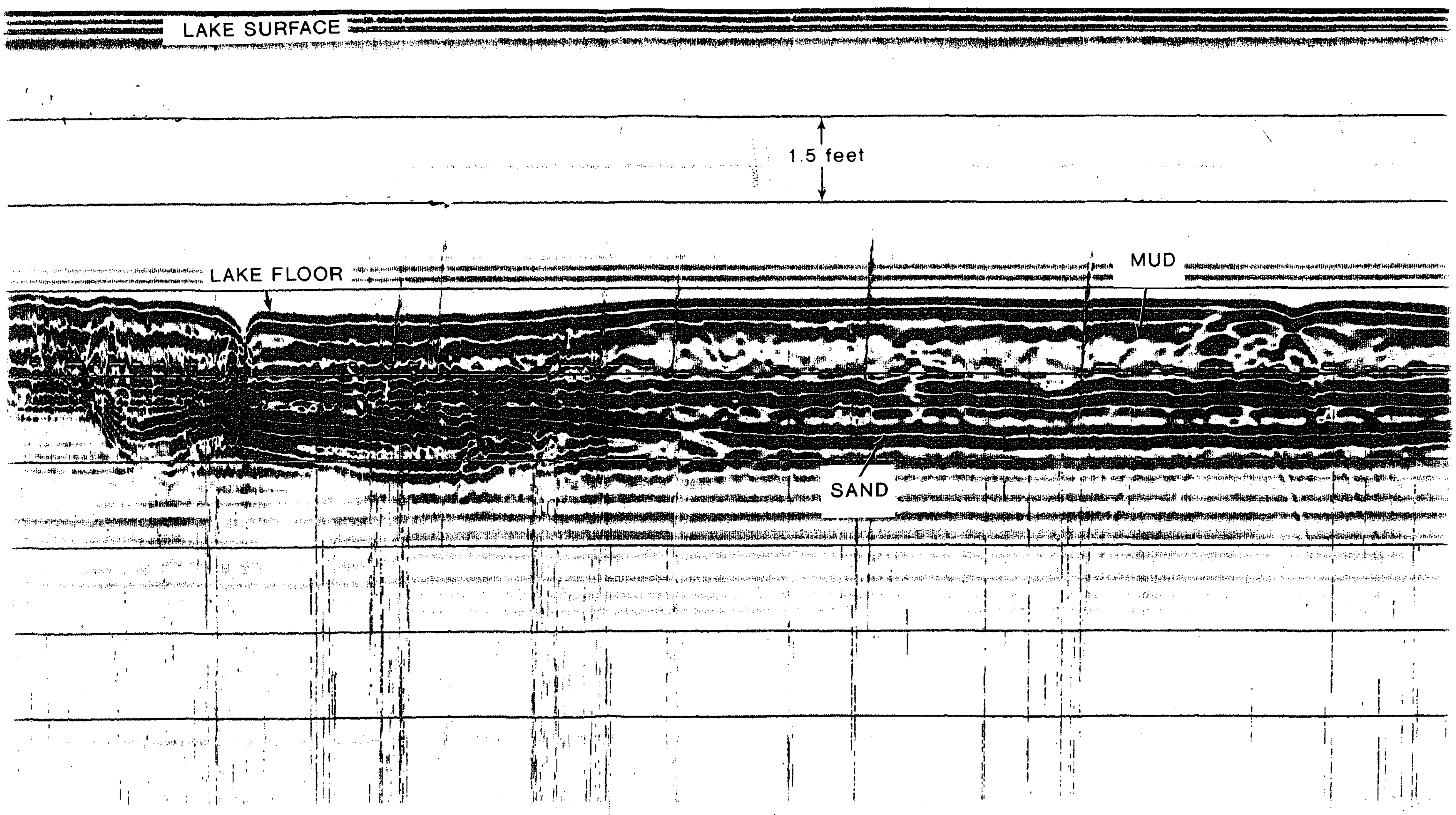


Figure 14

Sample GPR Record From Sawgrass Lake

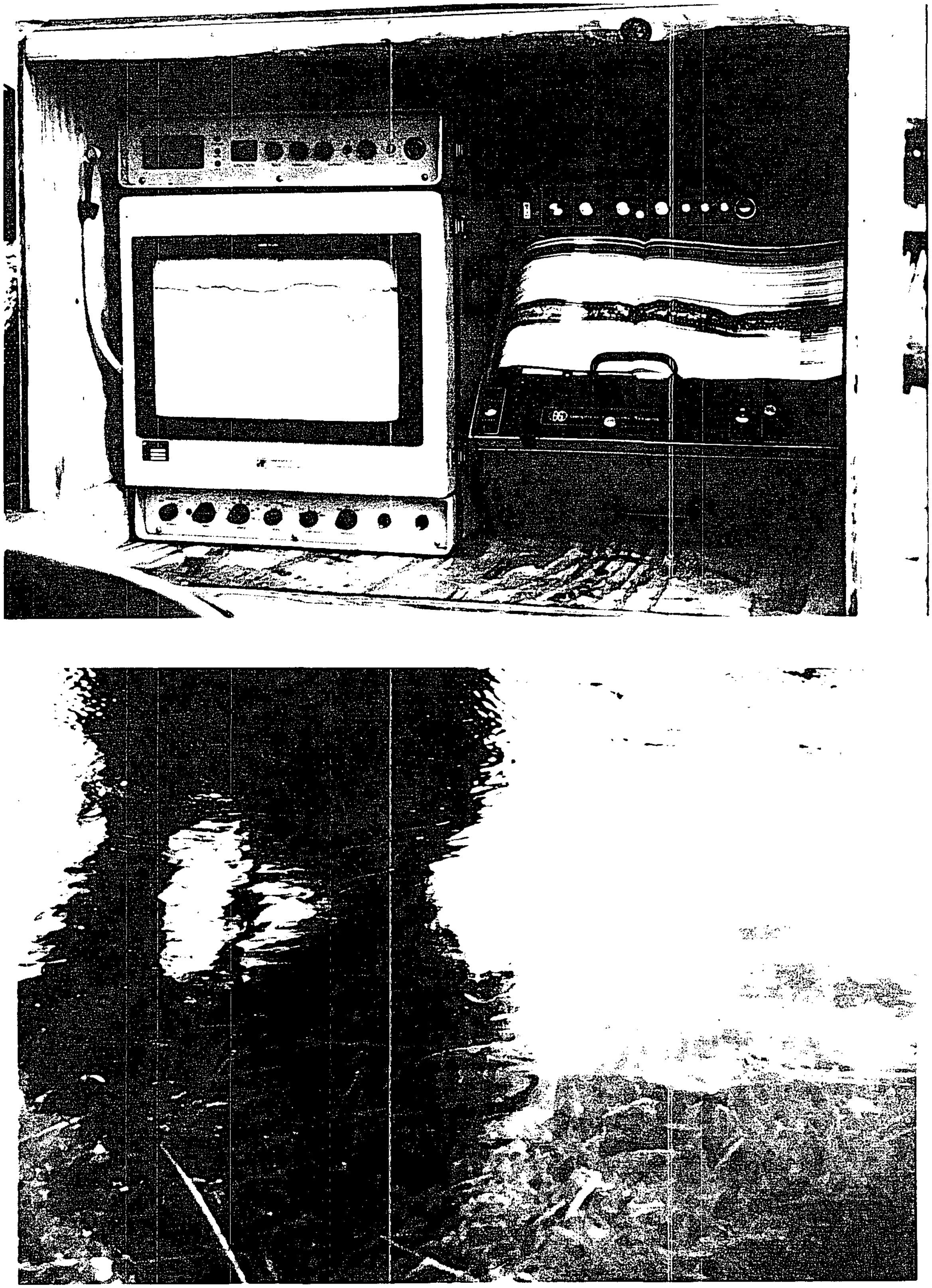


Figure 15

Fathometer & GPR Receiver on Airboat(Top) and Typical Lake Bottom Growth

Two methods of mounting the transducer array for the fathometer were tried, an over the side mount, and transmitting through the fiberglass hull of the airboat. In South and Fox Lakes water depths were extremely shallow averaging 2 feet or less, therefore testing was carried out over the small deeper area near Tiwa Lane in South Lake. Using the over-the-side mount the low frequency gave good records (Figure 16), but nothing could be obtained with the high frequency. The fathometer produces vertical scale lines (dotted) which represent 1 foot intervals from 0 to 50 feet at the scale employed. This model also places vertical lines on the record at 1 minute intervals. The zero depth line underneath the printed time shows increasing amplification as a thicker black line, which is evident around 38 and 39 minutes. The first thick black line afterwards, is the lake bottom, above which, a dotted line indicates that the depth digitizer is tracking the bottom. The record in Figure 16 was taken continually crossing the deep spot at the end of Tiwa Lane. In the second crossing (around a time of 39 minutes) the amplification (gain) was increased resulting in a very black record down the page as more energy is received. Here also, the increased gain produces what is probably noise in the water column at a depth of approximately 2.5 feet, which the depth digitizer picks up and tracks part of the way across. Note that the shallow spots on either side of the hole are truncated and artificially flat. This represents the minimum depth capability of the fathometer at this operating frequency. There is no evidence of reflections from vegetation in the water column. Using the through-hull mount, the low frequency data were much less clear, but the high frequency seemed to work well. Overall, the data from the low frequency transducer is somewhat clearer and stronger. Both frequencies seem to penetrate submerged vegetation (the lower photograph in Figure 15 shows the type and amount of vegetation in the water column). In thick cattail areas the signal returns did become weaker and the digitizer had more bad data. Increasing the amplification helped to some degree. A graduated pole was used to check that the layer observed on the records corresponded to the solid lake bottom, but the fathometer was not calibrated.

Fathometer tests on Sawgrass Lake gave good results in the deeper water of this lake in that both frequencies again penetrated submerged aquatic plants, and gave a solid bottom return which was readily digitized. Figure 17 shows a section of Sawgrass Lake using the 40 kHz frequency and Figure 18 shows part of the same lake taken at a frequency of 210 kHz. Figure 17 shows a solid lake bottom return with low gain, which is both slightly deeper than South Lake and more irregular. Increased gain around 9 minutes again gives a much darker record and also shows up what are referred to as "multiples" of the lake bottom caused by acoustic energy reverberating back and forth in the water column. Again there is little or no evidence of vegetation, although a small mound appears on the bottom around 8 minutes time, which could be clump of weed or an object such as a large piece of trash. Figure 18 shows that the higher operating frequency produces a less distinct lake bottom, but that the digitizer has no problem in following it. The two high spots at 32 and 33 minutes become quite indistinct on top, and this may be evidence of some weed growth in shallow water. Again, towards the end of the record at 35 minutes time, the bottom becomes very shallow and is truncated by the fathometer around 3 feet.

Although in South and Fox Lakes the fathometer produced reliable digital data, the unit would only read to a minimum depth of 2 to 3 feet for the high frequency and 3 to 4 feet for the low frequency. Since a great part of the lake was at this depth or less at the time of the survey, using the fathometer was not cost-effective.

Results have shown, however, that taking valid automated data in these lakes, even with substantial submerged and emergent vegetation, is possible if data can be obtained in shallow water. New fathometer models now becoming available are specifically designed to read down to under 1 foot of water beneath the transducer.

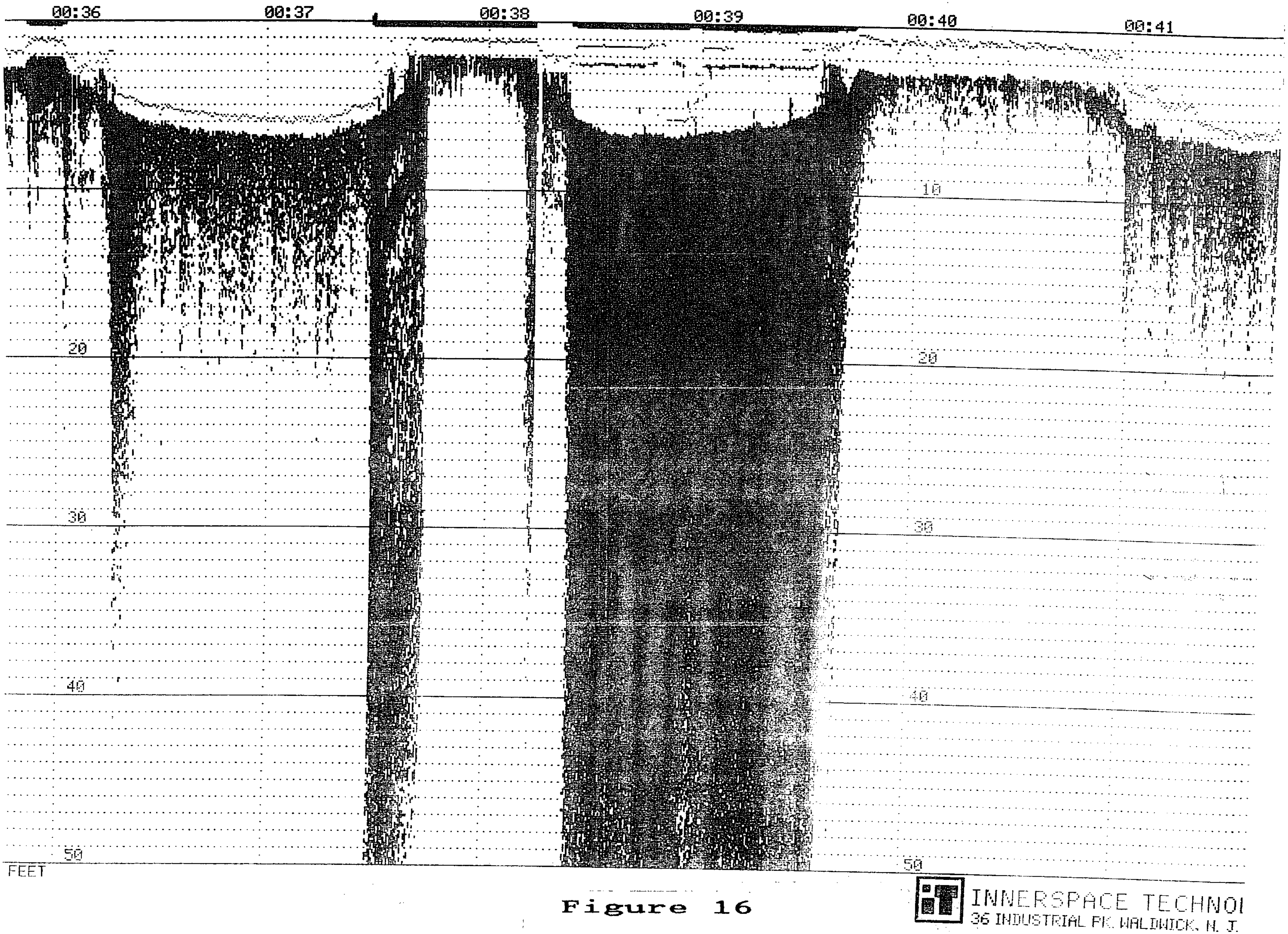


Figure 16

Fathometer Record From South Lake (40 kHz)

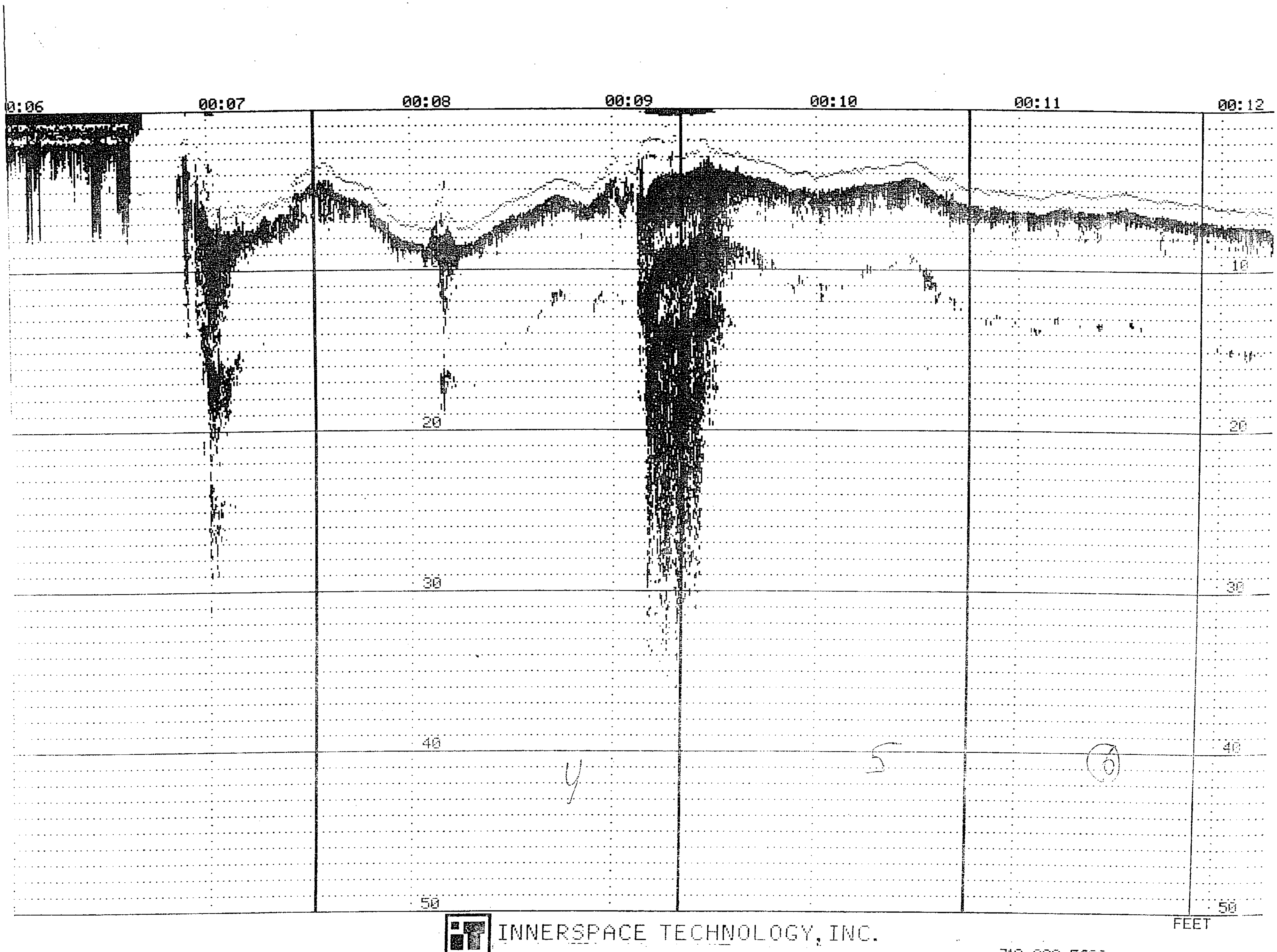
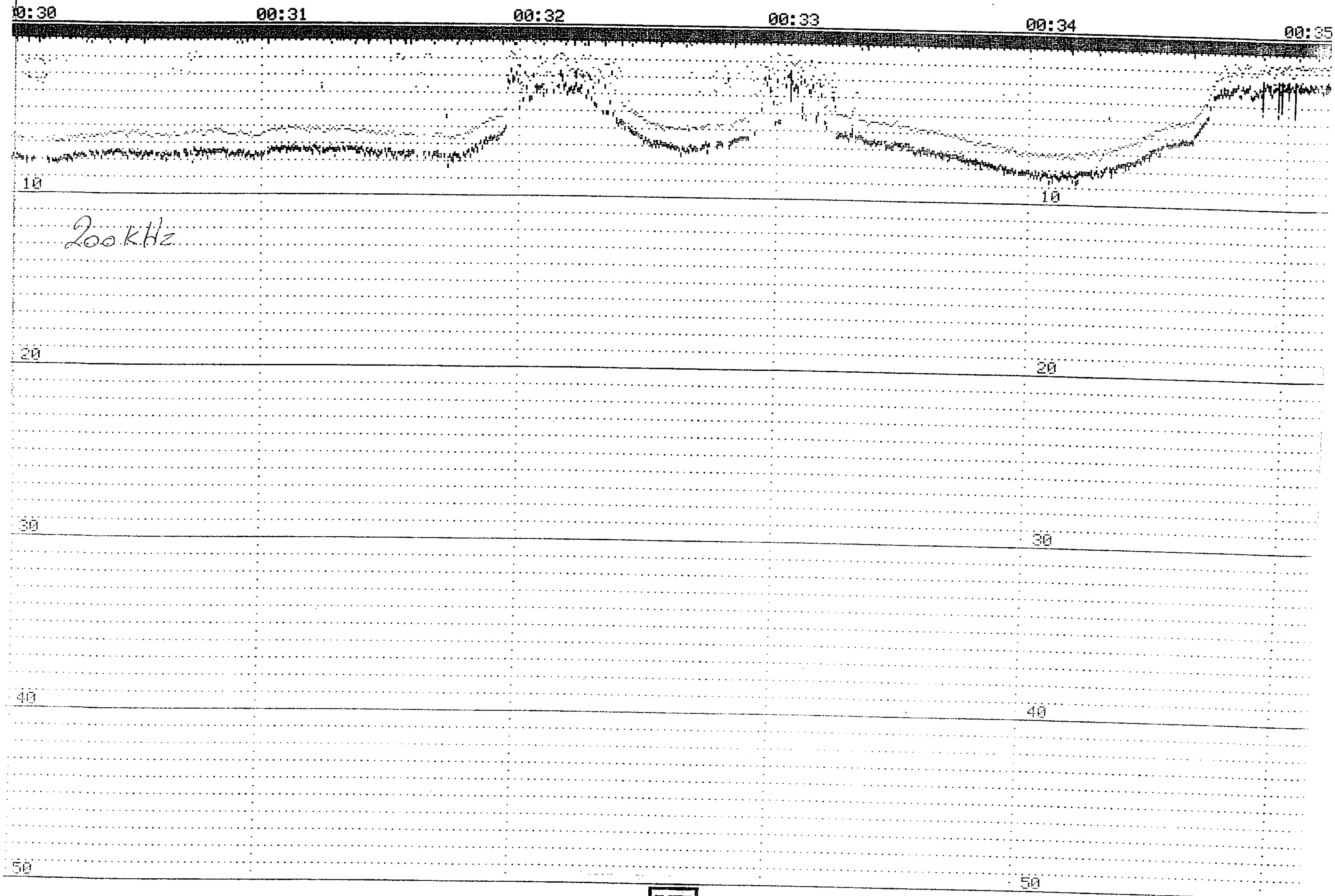


Figure 17

Fathometer Record From Sawgrass Lake (40 kHz)



INNERSPACE TECHNOLOGY, INC.
36 INDUSTRIAL PK. WALDWICK, N. J. 07463 (201) 447-0398 TWX 710-98

Figure 18

Fathometer Record from Sawgrass Lake (210 kHz)

2.3.5 Manual Data Acquisition

Figures 19, 20, and 21 show the methodology used for manual data acquisition.

A measuring pole marked in feet and graduated in 0.2 foot intervals was used with a 6" diameter circular saw blade at the end to limit penetration into the lake bed. Measurements were taken at 100 foot intervals along the survey line. Simultaneously with the depth measurement the computer would record the boat's position at that time to be printed out on hard copy. In areas of emergent vegetation, particularly cattails, the saw blade became caught in the root mat and the sounding pole was replaced by a similarly graduated piece of two inch by four inch wood (see Figure 20). Although the wood had a cross-sectional area of eight square inches verses 19 square inches for the saw blade, tests of both methods showed no extra penetration of the bottom by the wood.

Intervals of 500 feet were marked with a buoy. When the line was complete, the boat returned to each marker buoy to measure sediment depth. A 20 foot long piece of #4 rebar graduated in foot and 0.5 foot intervals was used to probe for the hard sand layer beneath the organic sediments (see Figure 21).

Figure 19

Manual Water Depth Measurement

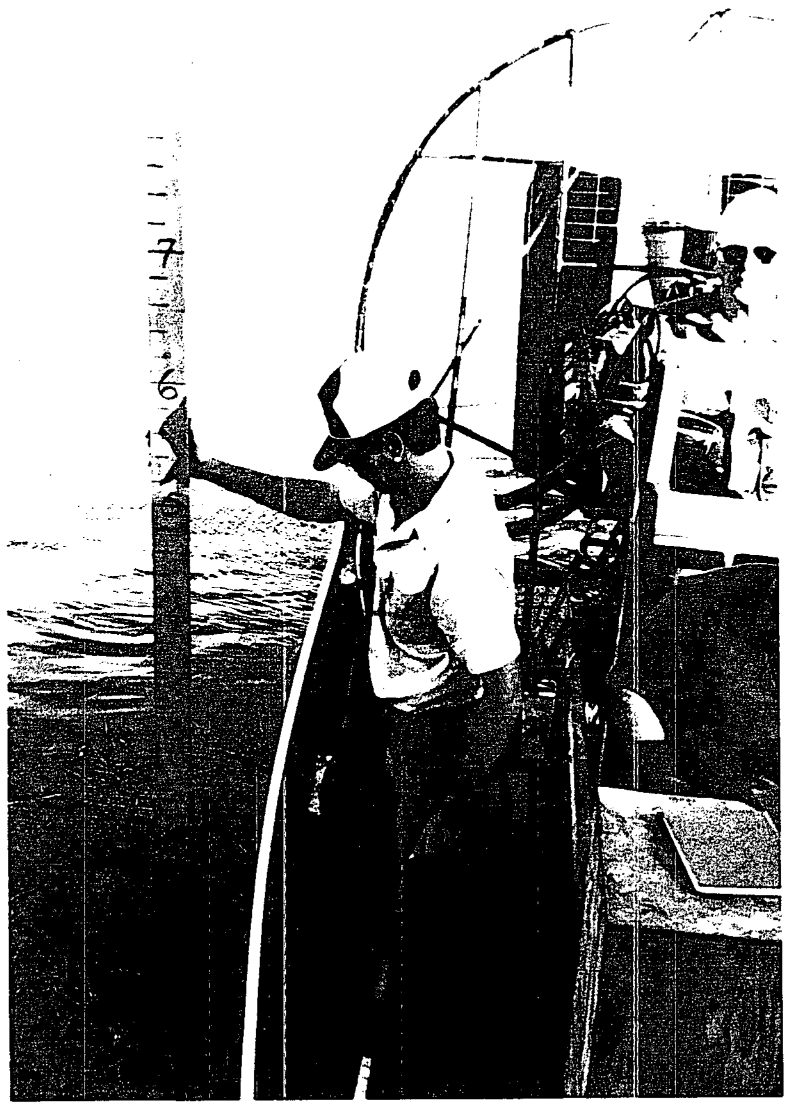


Figure 20

Manual Water Depth Measurement

Figure 21

Manual Probing for Base of Organic Sediment Layer (Hard Bottom)

3.0 HYDROLOGIC DATA REDUCTION AND RESULTS

Depth data were tabulated with the corresponding horizontal position from the manual fix information and the positions entered into a computer and recorded on magnetic disk. These data were then used to produce the plan view chart in Figure 7 showing the orientation and the length of the lines run. As the man probing over the side of the boat was not in the same place as the prism array a slight offset had to be taken into account. This offset was four feet to starboard and two feet ahead of the prism array (average). This correction was applied to the recorded easting and northings for data points on each line.

The tabulations for each line are shown in Appendix I together with plan view charts showing depth contours in relation to the lake shoreline. The tabulated data were transferred to floppy disk on an IBM PC using Lotus 1-2-3, copies of which are included with this report. The data tabulations included the northing and easting of each data point, the measured water depth, depth to the hard sand layer (Hard Depth) at the base of the organic sediments, the water elevation at the time of the survey, and the elevations of the lake bottom and the top of the hard sand layer, referenced to NGVD. Station spacing down the line together with the difference from the ideal 100 foot spacing are also shown. In several cases the boat was not able to get to either the ideal start or end of line due to the thick cattails and brush growth extending along the lakeshore. This has a small effect on the mean and standard deviation of the difference from the ideal downline station. The distance the airboat was off the intended line at the time of taking data readings is included, together with the mean and standard deviation. The latter analysis was not done for lines S1 and S2 (Figure 7) which are not orientated either east:west or north:south (See section 4.0 below for a discussion of errors and data quality).

The water level for each line was read off the records to the nearest 0.01 feet, but depth measurements could only be taken to the nearest 0.1 feet. Resulting elevations are therefore quoted to a precision of 0.1 feet.

The results are shown here reduced, and at full scale in Appendix I:

1) Plan view charts at a scale of 1 inch = 600 feet showing the lake bottom elevation contoured at 1 foot (Figure 22) and 0.5 meter (Figure 23) intervals reference NGVD.

2) Plan view charts at a scale of 1 inch = 600 feet showing the elevation of the top of hard sand (hard bottom) contoured at 1 foot (Figure 24) and 0.5 meter (Figure 25) intervals reference NGVD.

Contouring South Lake proved to be a problem for the computer due to the overall data density and the presence of a relatively deep yet narrow channel around the Tiwa Lane cul-de-sac and a "hole" immediately to the south. Since the stage:area and stage:volume curves had to be generated by computer this necessitated putting in zero water depths (i.e. an average water level elevation of 15.60 feet) by hand along the outline of the cul-de-sac and even around the digitized lake shore to force a more realistic model. The program used to derive stage:area and volume relationships, "SURFER", works by interpolating the data into a three dimensional regularly spaced grid. This requires a trial and error procedure to determine the best set of gridding parameters to apply to the data. The lake bottom elevation data were processed using several different parameter sets to assess the variability of the results. The final model was processed using a 50 foot grid spacing using the technique of "Kriging". The sub-routine UTIL then allows slicing of the lake at various elevations to determine the area of the surface of the lake (stage:area), and also to compute the volume of the lake below a given elevation (stage:volume). Both relationships were determined for elevations between 15.6 and 4.0 feet (Table 2 and Figures 26 and 27).

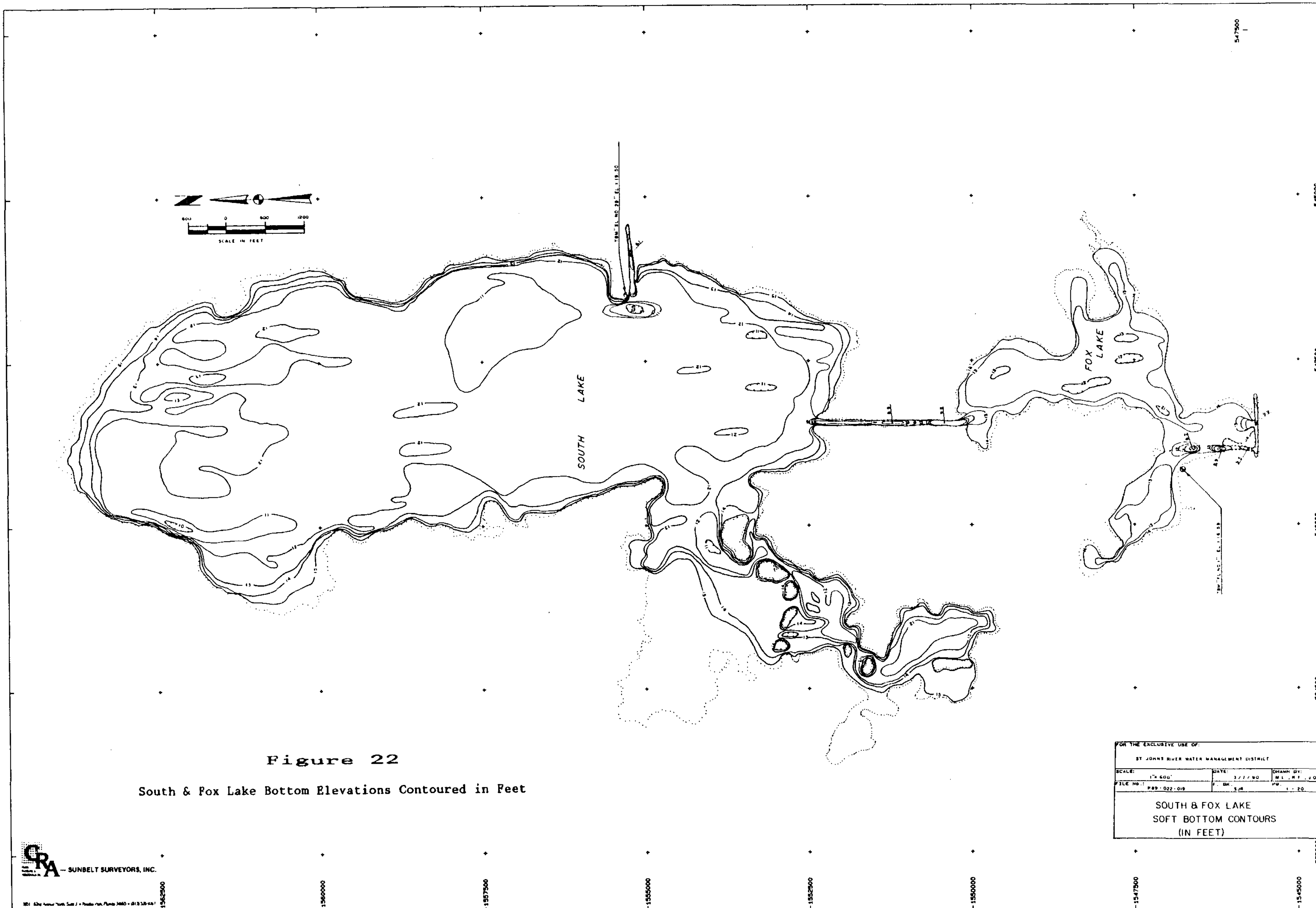


Figure 22

South & Fox Lake Bottom Elevations Contoured in Feet

FOR THE EXCLUSIVE USE OF:

ST JOHNS RIVER WATER MANAGEMENT DISTRICT

SCALE: 1"= 600'	DATE: 3/7/90	DRAWN BY: ML, RF, JO
FILE NO.: P89-022-019	F. BK. SJR	PG. 1-20

SOUTH & FOX LAKE
SOFT BOTTOM CONTOURS
(IN FEET)

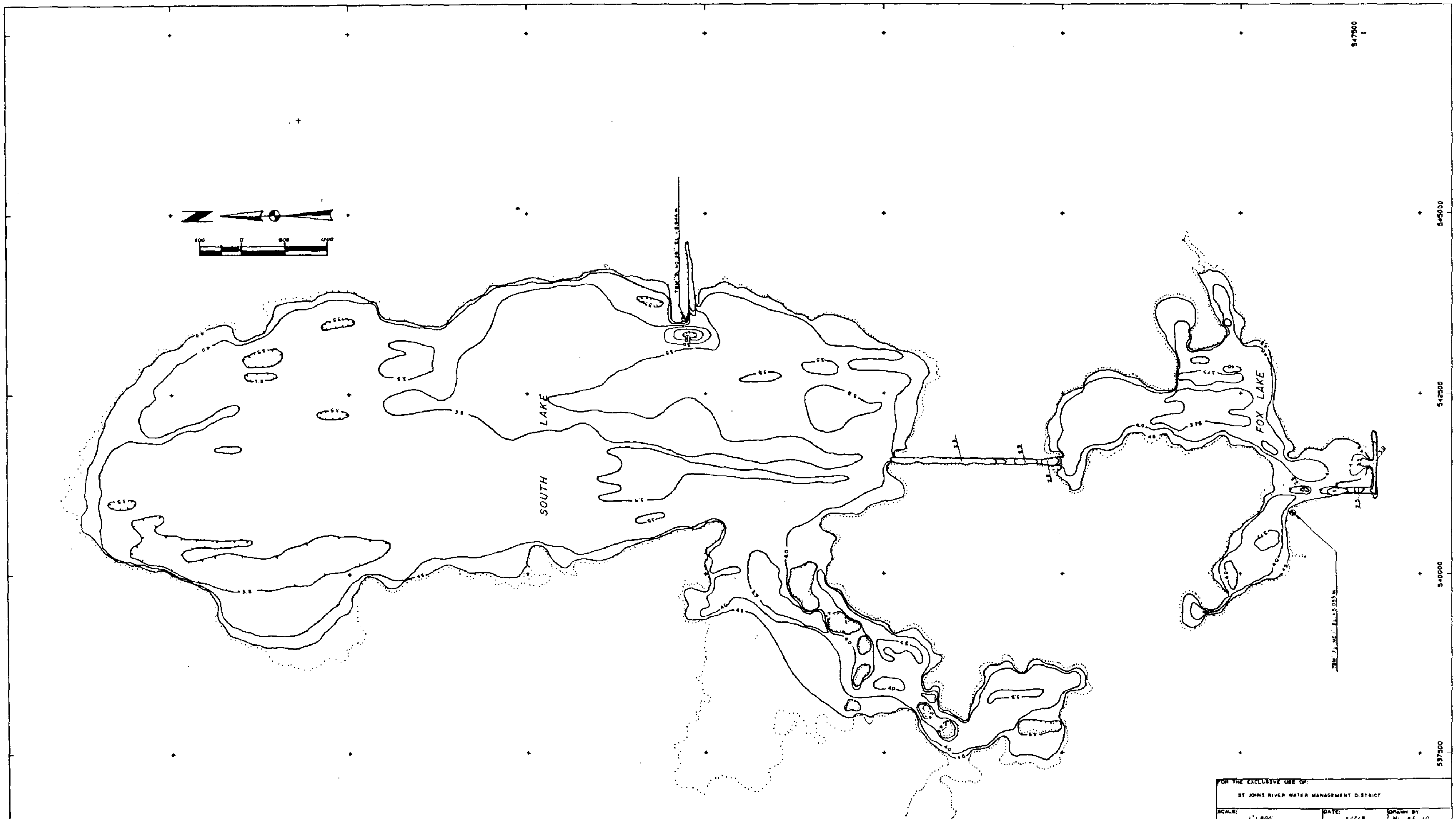


Figure 23

South & Fox Lake Bottom Elevations Contoured in Meters

FOR THE EXCLUSIVE USE OF:
ST JOHNS RIVER WATER MANAGEMENT DISTRICT

SCALE: 1" = 600'	DATE: 3/7/9	DRAWN BY: ML, RF, JD
FILE NO.: P89-022-018	F. BK. SJR	PG. 1-20

SOUTH & FOX LAKE
SOFT BOTTOM CONTOURS
(IN METERS)

CRA — SUNBELT SURVEYORS, INC.

SHEET 4 OF 6

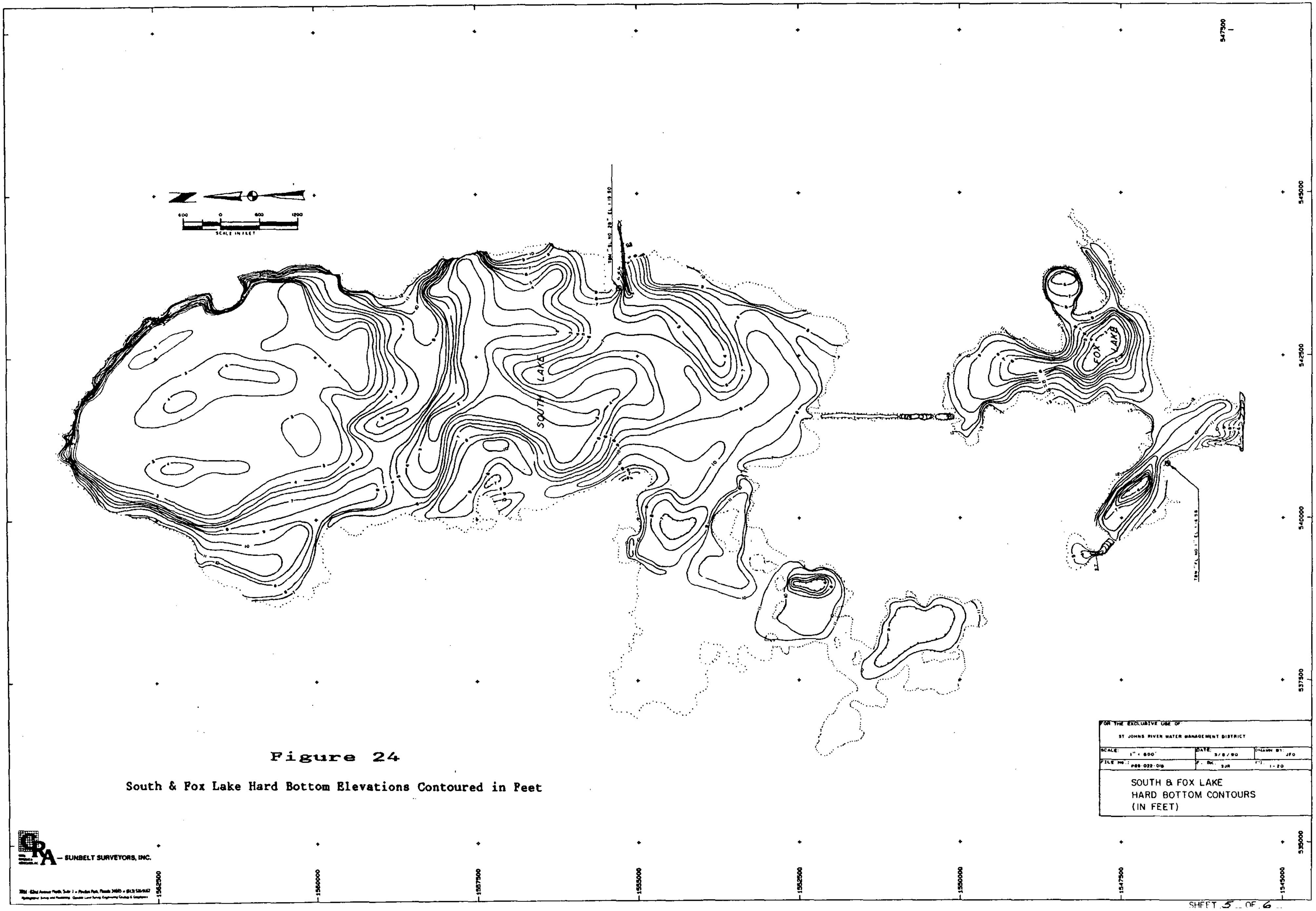


Figure 24

South & Fox Lake Hard Bottom Elevations Contoured in Feet

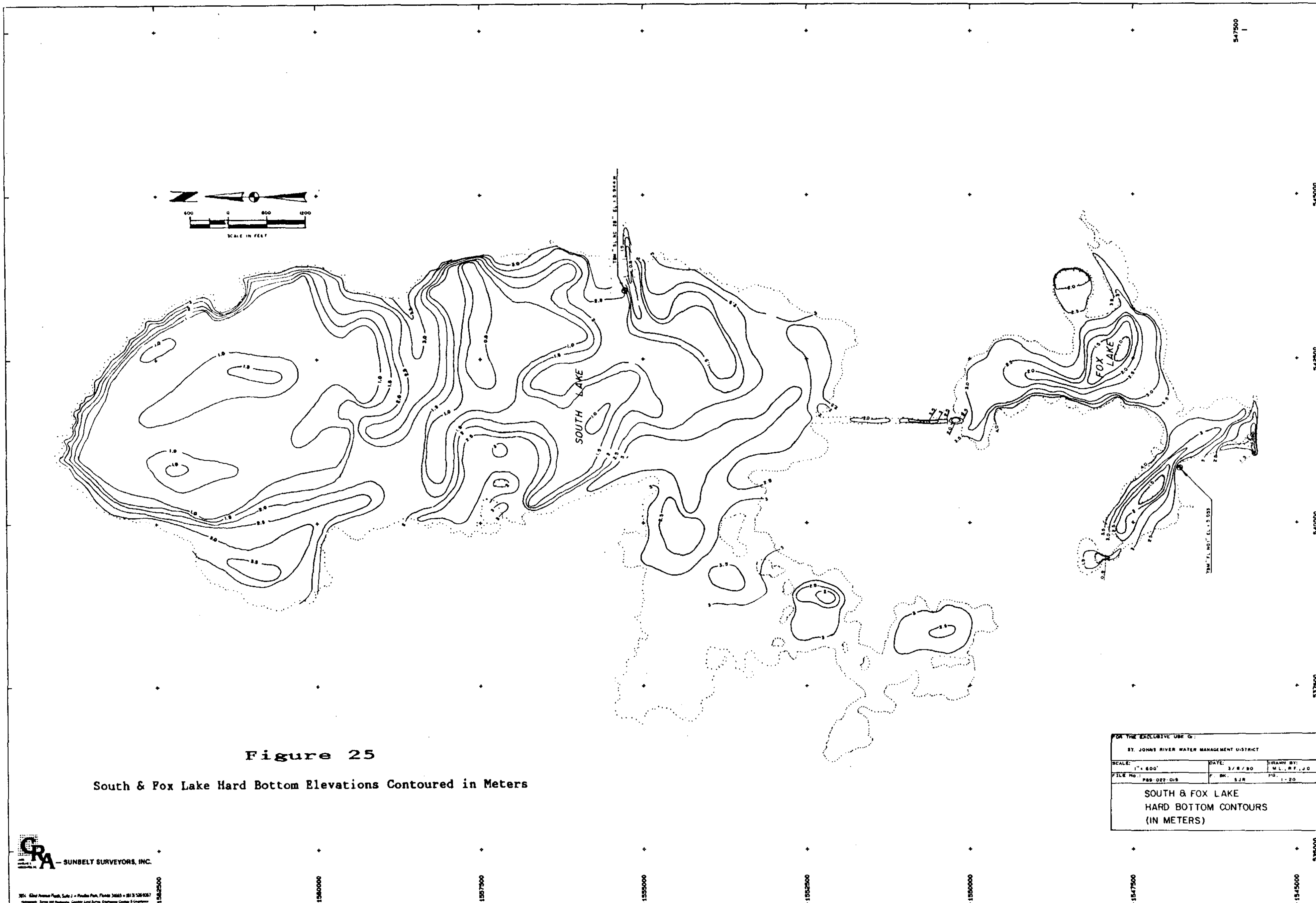


Figure 25

South & Fox Lake Hard Bottom Elevations Contoured in Meters

SHEET 6 OF 6

SOUTH and FOX LAKES

Elevation (Feet ref NGVD)	Volume (Cubic Feet)	Area (Square Feet)
15.6	173484000	58693400
15.0	141528000	52322000
14.0	92411100	47217600
13.0	49066000	40025700
12.0	14452400	27462200
11.0	1764100	2960500
10.0	677500	397100
9.0	411400	232200
8.0	257400	109000
7.0	167600	75600
6.0	103600	53800
5.0	58400	37600
4.0	27900	
Total	474409400	

Table 2

Tabulation of Lake Volume and Area at a Given Elevation (From "SURFER" Computer Program)

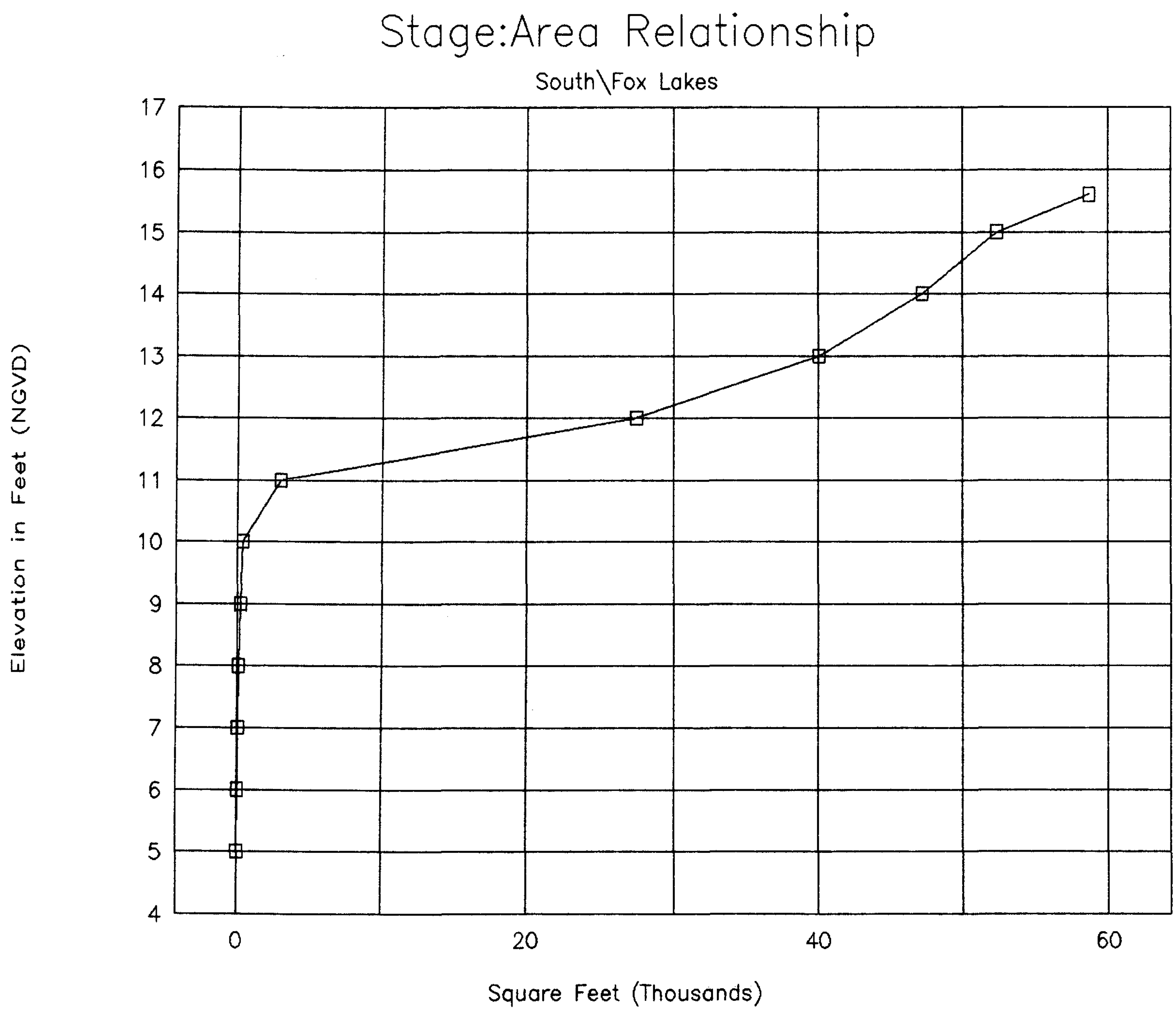


Figure 26

Stage (Elevation):Area Curve for South and Fox Lakes

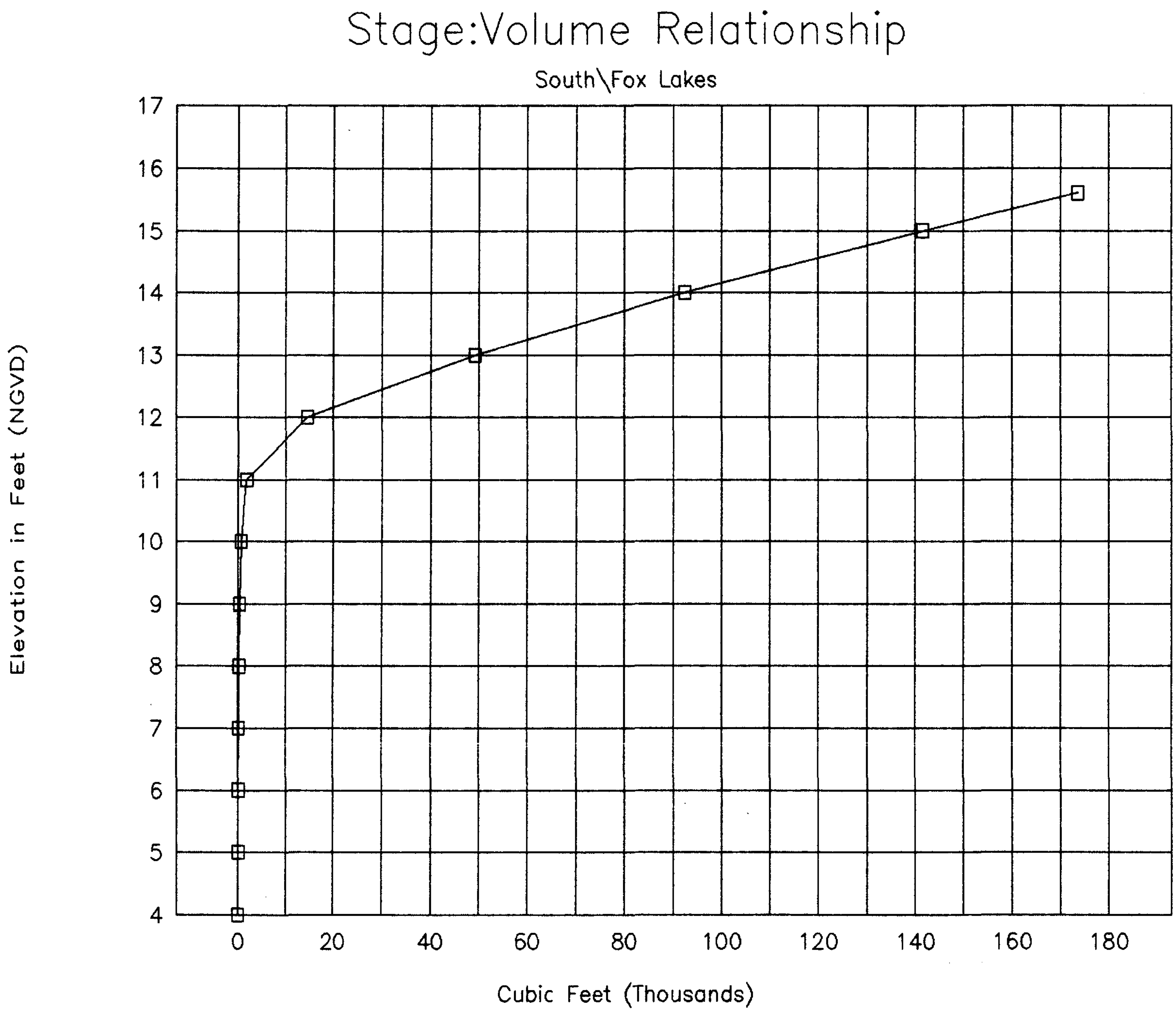


Figure 27

Stage (Elevation):Volume Curve for South and Fox Lakes

4.0 ERRORS AND DATA QUALITY

4.1 Horizontal Position

The primary control for the hydrographic survey was the GPS monuments. A discussion of the errors in the final positions of these monuments was included in section 3.1. From the results obtained the errors in these positions are small (approx. 1 to 2 tenths of a foot) although this can
only be judged at present by the internal consistency of the data and the measurement of a couple of baselines. To get a good estimate of absolute error a number of baselines to several other first order points outside the project area would be necessary. Because any errors are likely to be a constant for each GPS data set, the effects of errors in the GPS monuments is not considered in deriving the following overall accuracy estimates for the hydrographic data.

The Lasertrak is quoted by the manufacturer as being accurate to 30 cm (1 foot), although measurements of known baselines with this instrument have been carried out in the past and a repeatable accuracy of six inches is the largest error that has been observed. The larger source of error is in the horizontal angle (the vertical angle is not used directly in position computation), which is accurate to 36 seconds of arc. This error is range dependent, being larger at greater ranges. It is matched or slightly exceeded by the operator either not properly adjusting the telescope cross-hairs to the center of the laser beam, or by not keeping the cross-hairs in the telescope centered on the prism array. The laser beam has to be wide enough to hit a moving prism, and so the possibility exists that the cross-hairs might not be on the prisms, yet the laser beam may get a return. This will not cause any significant error in range, but as the horizontal angle encoder is read at the time of receiving a laser return, an angular error may result. Extensive experience with the Lasertrak has indicated that over ranges up to one mile, the average likely position error is two feet (including all sources of error).

There is another consideration in taking any position data on a moving vessel, and that is the interval between the time of measurement at the Lasertrak and when that information comes over the telemetry link and reaches the input port of the computer. Several tests with three Lasertrak units has yielded a correction factor based on a measurement rate of twice per second which is built into the computer software.

From a purely qualitative examination of errors in horizontal positioning of the survey vessel the <u>maximum</u> likely error in easting and northing is therefore less than plus or minus three feet (one meter) absolute accuracy.

4.2 Depth Measurement and Water Level Corrections

The main source of error in depth measurements is in the precision and consistency of manual probing of water depth and sediment thickness. In the case of the water depth, the pole used was graduated in increments of 0.2 feet, and for measurement of sediment depth, to 0.5 feet. It has been estimated that a person can interpolate reliably to no better than 1/4 to 1/5th of the marked increment. As the airboat was still moving during a reading, and even small waves make the water surface move up and down the measuring rod, it is estimated that the measurement precision was no better than 0.1 feet for water depth and 0.2 feet for sediment depths.

Another source of error is the actual horizon being measured by this method. It was not known where the true lake bottom was within the base of thick vegetation. This cannot be answered without investigation of the lake floor, perhaps by taking core samples. The data in this report are therefore dependent on the methodology used. Comparisons with other data obtained using different methodology require a check in the field using both at the same spot.

The accuracy of water level corrections depends on the accuracy with which the recorders were surveyed in, and the precision of the instruments. The recorders were surveyed in from FDOT second order control by a three wire level which is accurate to 0.05 feet. The recorders themselves were checked every day to 0.01 feet. Water level readings at South and Fox lakes (see Table 1) were checked for calibration on every survey day. The differences in elevation between the two recorders is consistent at 0.05 feet. It may be caused by a hydraulic gradient between the two lakes, which are connected by a narrow channel. Fox lake is upstream of South Lake, and consistently showed a higher water elevation. However, most of the difference is likely to be the cumulative error in levelling in the two recorders.

Theoretically, the average likely error in final elevations would conservatively be ± 0.2 feet (2 1/2 inches) for lake bottom elevations, and 0.3 feet (3 1/2 inches) for the sediment thickness.

4.3 Field Comparisons

Two lines were run twice, for lake bottom measurements only, to compare repeatability. Comparisons were also carried out at a couple of points with probings of the sediment thickness and it was observed that the readings were within +/- 0.2 feet.

Line 95+00

Line 95+00 was run twice, first in one direction then the other. Data points were taken at as close to 100 foot intervals as possible (Table 3). The differences in water depths averaged only 0.1 feet with a standard deviation of 0.3 feet (Figure 28). However, comparisons should be made carefully, due to the impossibility of keeping an airboat on exactly the same line. The last two columns of Table 3 show the differences in easting (X) and northing (Y), between data points that should ideally have been in the same place. Although the averages over the whole line were quite close (3.6 and -0.7 feet for easting and northing respectively), the standard deviations were relatively large at 18.16 and 46.09 feet respectively. Therefore the difference at sample #34 of 1.2 feet is partly explained by a difference of 60 feet in the locations of the two data points. Given that data points are not coincident, a standard deviation of 0.3 feet in elevations is close to the estimate of 0.2 feet accuracy of measurement for lake bottom elevations derived in section 4.2.

Line 90+00

Line 90+00 was also run twice in different directions, but unlike line 95+00 above, one end of the line was used as a starting point
for one run, and the other end of the line used for the second run. As the line is not an even multiple of 100 feet long, the positions of data points were shifted with respect to each other, an average of 43 feet (the line was orientated east-west; Table 4). However, the results are consistent with those for line 95+00. The variation in northings (offline) for the two runs was an average of only 1.4 feet, but again the standard deviation was 48.3 feet indicating that the airboat was snaking down line. The tabulated variation in depths is meaningless due to the downline offset between the two data sets. The fact that the depth comparison came in at 0.0 feet (average) with a standard deviation of 0.3 feet, the same as for line 95+00, reflects the very flat and uniform nature of the lake bed. Figure 29 shows the results in graphical form.

The data from these lines show that, as a quantitative tool to determine repeatability of data, trying to run the same line twice, is not a precise measure. Taking the differences in data point positions into account, a standard deviation of 0.3 feet from these data supports the estimate that the likely vertical error in elevations is +/- 0.2 feet.

LINE 95+00			LINE 95+00R			(All Numbers are in Feet)		
X(1) Easting	Y(1) Northing	Z(1) Elevation	X(2) Easting	Y(2) Northing	Z(2) Elevation	Z(1)-Z(2)	X(1)-X(2)	Y(1)-Y(2)
540358	1554257	11.7	540358	1554257	11.5	0.2	0.0	0.0
540461	1554207	11.7	540469	1554319	11.7	0.0	-8.0	-112.0
540554	1554215	11.5	540533	1554317	11.6	-0.1	21.0	-102.0
540654	1554204	11.7	540650	1554175	11.5	0.2	4.0	29.0
540743	1554245	11.9	540741	1554173	11.9	0.0	2.0	72.0
540852	1554213	12.3	540852	1554213	11.9	0.4	0.0	0.0
540956	1554204	12.3	540936	1554257	11.9	0.4	20.0	-53.0
541057	1554240	12.3	541057	1554240	11.9	0.4	0.0	0.0
541152	1554207	12.1	541134	1554244	11.9	0.2	18.0	-37.0
541253	1554231	11.5	541271	1554321	11.7	-0.2	-18.0	-90.0
541352	1554234	11.3	541343	1554198	11.5	-0.2	9.0	36.0
541456	1554249	11.5	541450	1554219	11.5	0.0	6.0	30.0
541555	1554240	11.3	541559	1554228	11.1	0.2	-4.0	12.0
541683	1554233	11.3	541650	1554192	11.3	0.0	33.0	41.0
541770	1554228	11.3	541764	1554230	11.3	0.0	6.0	-2.0
541858	1554215	11.7	541871	1554205	11.5	0.2	-13.0	10.0
541949	1554231	11.7	541976	1554180	11.7	0.0	-27.0	51.0
542058	1554247	11.7	542061	1554252	11.7	0.0	-3.0	-5.0
542149	1554215	11.9	542175	1554186	11.7	0.2	-26.0	29.0
542254	1554216	11.9	542235	1554181	11.7	0.2	19.0	35.0
542354	1554256	12.1	542359	1554249	11.9	0.2	-5.0	7.0
542455	1554259	11.7	542455	1554259	11.7	0.0	0.0	0.0
542565	1554230	11.9	542559	1554232	11.7	0.2	6.0	-2.0
542673	1554225	11.3	542636	1554258	11.5	-0.2	37.0	-33.0
542759	1554276	11.5	542759	1554276	11.5	0.0	0.0	0.0
542854	1554208	11.7	542860	1554234	11.7	0.0	-6.0	-26.0
542957	1554184	11.5	542947	1554206	11.7	-0.2	10.0	-22.0
543074	1554281	11.5	543074	1554281	11.3	0.2	0.0	0.0
543165	1554293	11.7	543172	1554230	11.9	-0.2	-7.0	63.0
543255	1554280	11.5	543262	1554163	11.3	0.2	-7.0	117.0
543352	1554176	11.9	543360	1554226	12.1	-0.2	-8.0	-50.0
543450	1554225	12.3	543475	1554242	11.7	0.6	-25.0	-17.0
543569	1554249	12.3	543526	1554203	11.9	0.4	43.0	46.0
543660	1554222	13.1	543602	1554240	11.9	1.2	58.0	-18.0
543750	1554206	13.7	543754	1554241	13.6	0.1	-4.0	-35.0
543855	1554234	13.7	543855	1554234	14.1	-0.4	0.0	0.0
					AVG	0.1	3.6	-0.7
					STD	0.3	18.2	46.1

Table 3

Data Quality Analysis - Line 95+00, South Lake

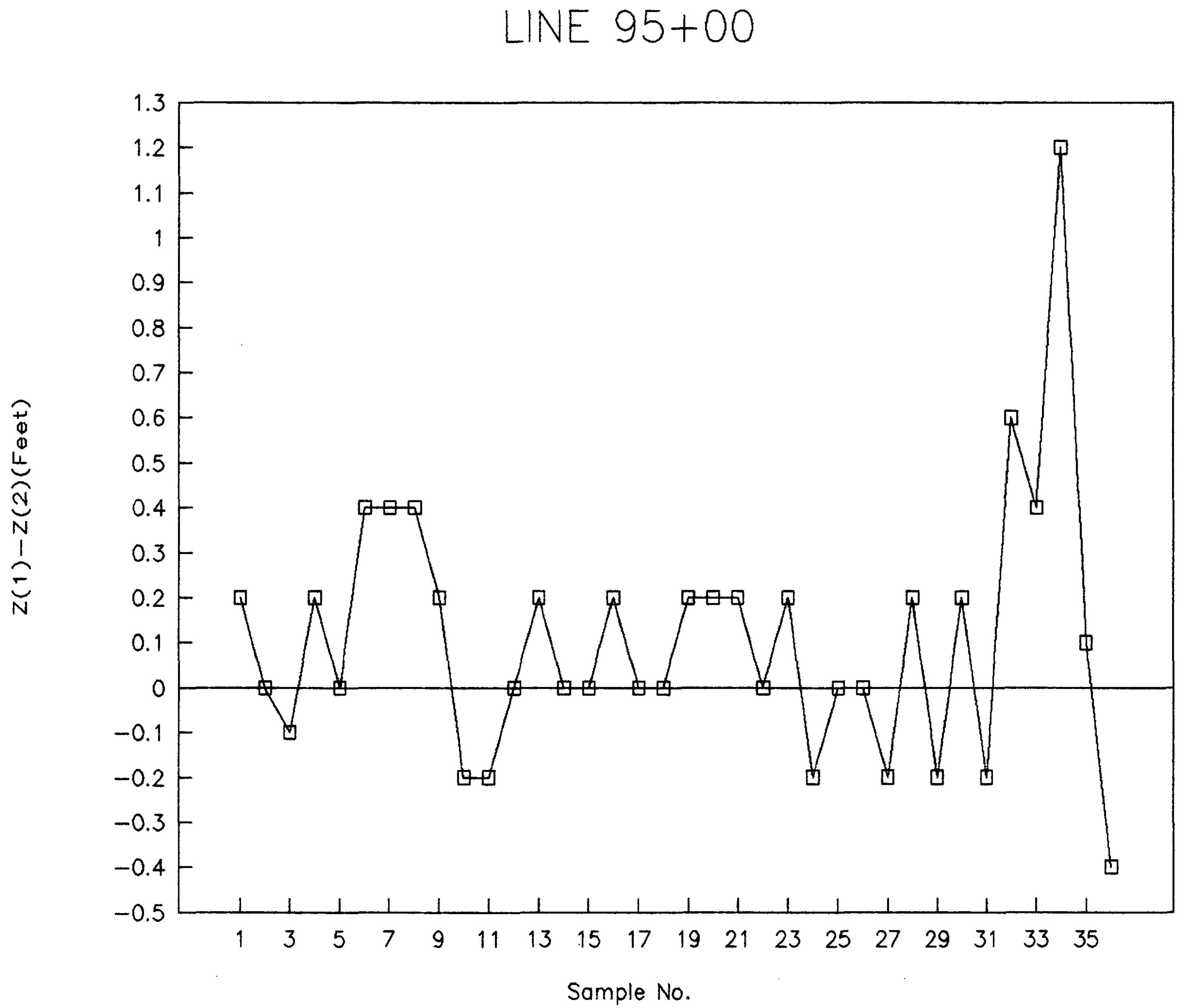


Figure 28

Graph of Differences in Depth Measurements at Each Sample Point - Line 95+00

LINE 90+00			LINE 90+00R			(All Numbers in Feet)		
X(1) Easting	Y(1) Northing	Z(1) Elevation	X(2) Easting	Y(2) Northing	Z(2) Elevation	Z(1)-Z(2)	X(1)-X(2)	Y(1)-Y(2)
544029	1554710	13.9	544014	1554738	13.3	0.6	15.0	-28.0
543917	1554689	13.5	543954	1554730	12.5	1.0	-36.9	-41.3
543817	1554702	11.5	543851	1554738	12.3	-0.8	-33.5	-35.8
543713	1554749	11.9	543756	1554721	12.5	-0.6	-42.4	27.5
543616	1554727	11.7	543661	1554701	11.9	-0.2	-44.8	25.7
543507	1554699	11.7	543560	1554759	11.7	0.0	-53.0	-60.5
543404	1554707	11.7	543456	1554744	11.9	-0.2	-51.5	-36.9
543310	1554697	11.5	543352	1554710	11.7	-0.2	-42.4	-13.1
543204	1554693	11.9	543245	1554721	11.7	0.2	-41.0	-28.1
543108	1554686	11.9	543155	1554741	11.5	0.4	-46.7	-55.4
543017	1554699	11.5	543053	1554746	11.7	-0.2	-36.3	-46.6
542912	1554776	11.5	542953	1554711	11.5	0.0	-40.5	65.1
542811	1554759	11.5	542856	1554706	11.3	0.2	-45.5	53.3
542714	1554733	11.7	542754	1554726	11.9	-0.2	-39.7	6.8
542612	1554722	11.7	542659	1554759	11.9	-0.2	-47.4	-37.6
542517	1554716	11.9	542555	1554741	11.7	0.2	-38.3	-25.4
542415	1554695	11.5	542462	1554756	11.5	0.0	-47.0	-60.9
542314	1554737	11.7	542352	1554705	11.9	-0.2	-38.2	32.2
542218	1554728	11.5	542261	1554744	11.9	-0.4	-43.4	-16.6
542114	1554701	11.5	542164	1554750	11.7	-0.2	-49.9	-48.5
542017	1554748	11.5	542060	1554698	11.7	-0.2	-43.2	50.4
541916	1554774	11.5	541963	1554703	11.7	-0.2	-46.6	71.4
541814	1554703	11.3	541852	1554693	11.5	-0.2	-37.8	10.0
541716	1554699	11.3	541758	1554735	11.5	-0.2	-42.4	-35.8
541612	1554750	11.5	541653	1554733	11.3	0.2	-40.5	16.8
541501	1554733	11.5	541559	1554730	11.3	0.2	-58.0	3.7
541411	1554692	11.3	541461	1554713	11.5	-0.2	-49.9	-20.6
541313	1554779	11.7	541350	1554694	11.5	0.2	-36.6	85.4
541203	1554723	11.7	541249	1554627	11.5	0.2	-46.8	95.9
541108	1554669	11.7	541163	1554677	11.7	0.0	-55.5	-7.8
541009	1554720	11.5	541066	1554760	11.7	-0.2	-56.8	-40.4
540904	1554813	11.7	540955	1554679	11.7	0.0	-51.9	134.4
540811	1554748	11.7	540854	1554729	11.7	0.0	-43.7	19.0
540714	1554725	11.9	540762	1554737	11.9	0.0	-47.7	-12.1
					AVG	.0	-43.0	1.4
					STD	0.3	11.8	48.3

Table 4

Data Quality Analysis - Line 90+00, South Lake

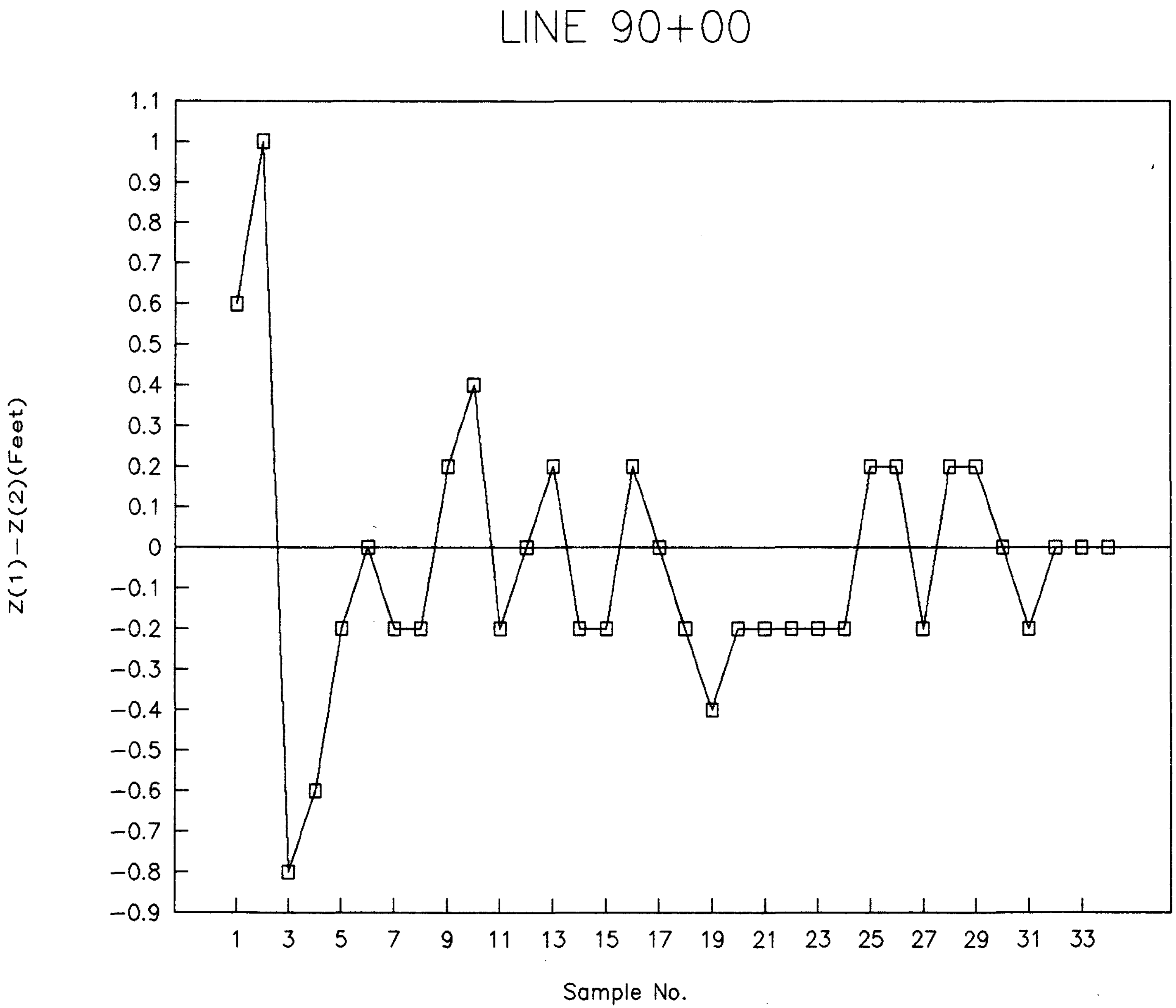


Figure 29

Graph of Differences in Depth Measurements at Each Sample Point - Line 90+00

4.4 Stage:Area and Stage:Volume Relationships

The different gridding methods and parameters for stage:area and stage:volume relationships gave volume differences at the higher elevations of around 5%. A gradual increase up to 10% was seen at lower elevations, but the volumes at these lower elevations were very small, basically limited to the hole at the end of Tiwa lane cul-de-sac. The three available methods within the program for determining volumes from a gridded data set, also gave differences of 5% or less.

Assessing the overall accuracy of these stage:area/volume curves rests with the practical difficulty in getting widely distributed data from areas in Fox Lake, and the western extension of South Lake where it was not possible to survey up to the digitized shoreline. This gives a large area over which the computer has assumed the lake bottom to be between 15 and 15.6 feet in elevation. This assumption is likely to be valid in that the area is extremely shallow, and may actually be above 15.6 feet elevation in some areas. Overall, the volumes and areas may be accurate to within 5% and may be on the high side of the true figures.

5.0 GLOSSARY OF TECHNICAL TERMS

Global Positioning System	A military system to determine a position anywhere on the Earth using signals from satellites in space in precisely known orbits. Presently available for use by civilians and capable of high accuracy.
Fathometer	An instrument designed to measure water depths to a very high level of precision. Uses a transducer in the water to emit high frequency sound waves that bounce off the sea bottom which are received again by the transducer. The electronics in the console measure the elapsed time and, using a determined value for the speed of sound, convert to depths and produce an analog chart and also to output digital values to a computer.
Baseline	The straight line joining two points on the Earth's surface. Usually applied to two points whose position coordinates are known, or are to be determined.
Azimuth	Angle measured clockwise from True North (0 to 360 degrees).
Bearing:bearing Intersection	Intersection of two lines with known azimuths.
Error Ellipse	Errors in a position can be resolved into two axes at 90 degrees to each other, which, being of unequal lengths (representing the value of the error in that direction) define an ellipse rather than a circle. In geodetic work the axes are defined as being north:south and east:west.
Benchmark	A monumented point of known elevation (height) on the Earth's surface which is always referenced to a specific datum (e.g. Mean Sea Level).
Three Wire Level	The process of using an accurate optical instrument to transfer elevations from one point to another.
Staff (Water Level)	A long pole, or piece of wood, graduated in feet or meters, which is placed in the water and fixed onto a rigid structure. It is then levelled in to a nearby benchmark to zero it in to the required datum.
Eccentric Points	Name given to points derived by offsetting a small distance from points whose position coordinates are already established.
Offtrack Distance	The perpendicular distance from a vessel's position to the intended survey line.
Downline Distance	The distance from the starting point of a particular survey line, to the vessel's position as projected back perpendicularly onto the line.
Conductivity	The property of a material to conduct an electric current.
Dielectric Constant	An electrically charged conductor tends to induce an equal and opposite charge in another conductor separated some distance from it in a vacuum. The ratio between the different sizes of the induced charge across a vacuum and across a particular medium (e.g. air or water) is defined as the Dielectric Constant of that medium.

Second Order Control	A measure of the accuracy in the horizontal coordinates of a point on the Earth's surface expressed as first, second (class I and II), or third (class I and II) order. Second order (class I) requires a position closure to better than 1 part in 50,000.

APPENDICIES

HYDROGRAPHIC SURVEYS

OF FOX AND SOUTH LAKES

TITUSVILLE, FLORIDA

Prepared for:

St. John's River
Water Management District

P.O. Box 1429
Palatka, Florida 32078

Prepared by:

CRA-Sunbelt Surveyors

P.O.Box 1967
Pinellas Park, Florida 34664

Ref No.: 10-ADM-08-00

Job#: P89022

March, 1990

VOLUME II - APPENDICES

APPENDIX "A"

Initial Scope of Work

Amendments

SCOPE OF WORK

I. INTRODUCTION

The determination of minimum surface water flows and levels for lakes and watercourses within the St. Johns River Water Management District (SJRWMD) has been mandated by Chapter 373.042, Florida Administrative Code (FAC). Minimum Flows and Levels (MFL) are to be established to protect the water resources; natural seasonal fluctuations in water flows and levels; and the ecological and social values associated with coastal, estuarine, and aquatic environments. These MFL are to be adopted as regulatory criteria used in the consideration of the issuance of permits for consumptive uses (17-40.08(2)(a),FAC) and in the declaration of a water shortage (17-40.08(2)(c), FAC).

The Upper St. Johns River Basin (USJRB) contains numerous lake basins. The determination of minimum level requirements for these lakes demands an understanding of their physical, chemical and biological properties. The characterization of the physical conditions of lakes is based primarily upon hydrographic (bathymetric) data. Accurate measurements of the bottom contours and sediment depths in the USJRB lakes are essential to the calculation of total volume of the lakes, and the development of stage storage curves, stage volume curves, and in combination with long-term surface water level monitoring, stage duration curves. The hydrographic mapping study will provide the data and resulting maps necessary for understanding these complex volume-area-stage relationships.

II. SCOPE OF SERVICES

A. Map the bottom contours and sediment thickness of the following USJRB lakes (see Figure 1):

Lake	Quad	Size
South Lake	Titusville	1100 acres
Fox Lake	Titusville	165 acres

Field tests to compare automated and manual methods for the determination of bottom soundings and sediment depths will be evaluated in Lake Sawgrass.

The study areas are delineated on Figures 1 and 2.

Data collection for each lake is to be made by charting along a 500 foot cross-section grid pattern. This is equivalent to a one-quarter inch grid pattern over a 7.5 minute U.S. Geological Survey quadrangle map of each lake basin. In localized areas of each lake, particularly at the inlets, outlets and in canals, a smaller cross-section grid pattern may have to be charted in order to more accurately represent the bottom contours in these areas.

The station locations on the cross-section grid patterns will be identified with a trisponder or comparable system to provide accurate ($\pm$ 3 meters) vessel position data. A Global Positioning System (GPS) receiver will be used to accurately ($\pm$ 3 meters) locate the trisponder network. Water depths and lake bottom contours will be charted with a recording fathometer or similar device, and/or manual methods. Organic sediment thickness to the underlying mineral deposits (sand bottom) will be determined by either manual methods and/or automated techniques such as ground penetrating radar (GPR). New or innovative technological approaches are welcomed providing these techniques are proven to be reliable by comparisons with manual field measurements.

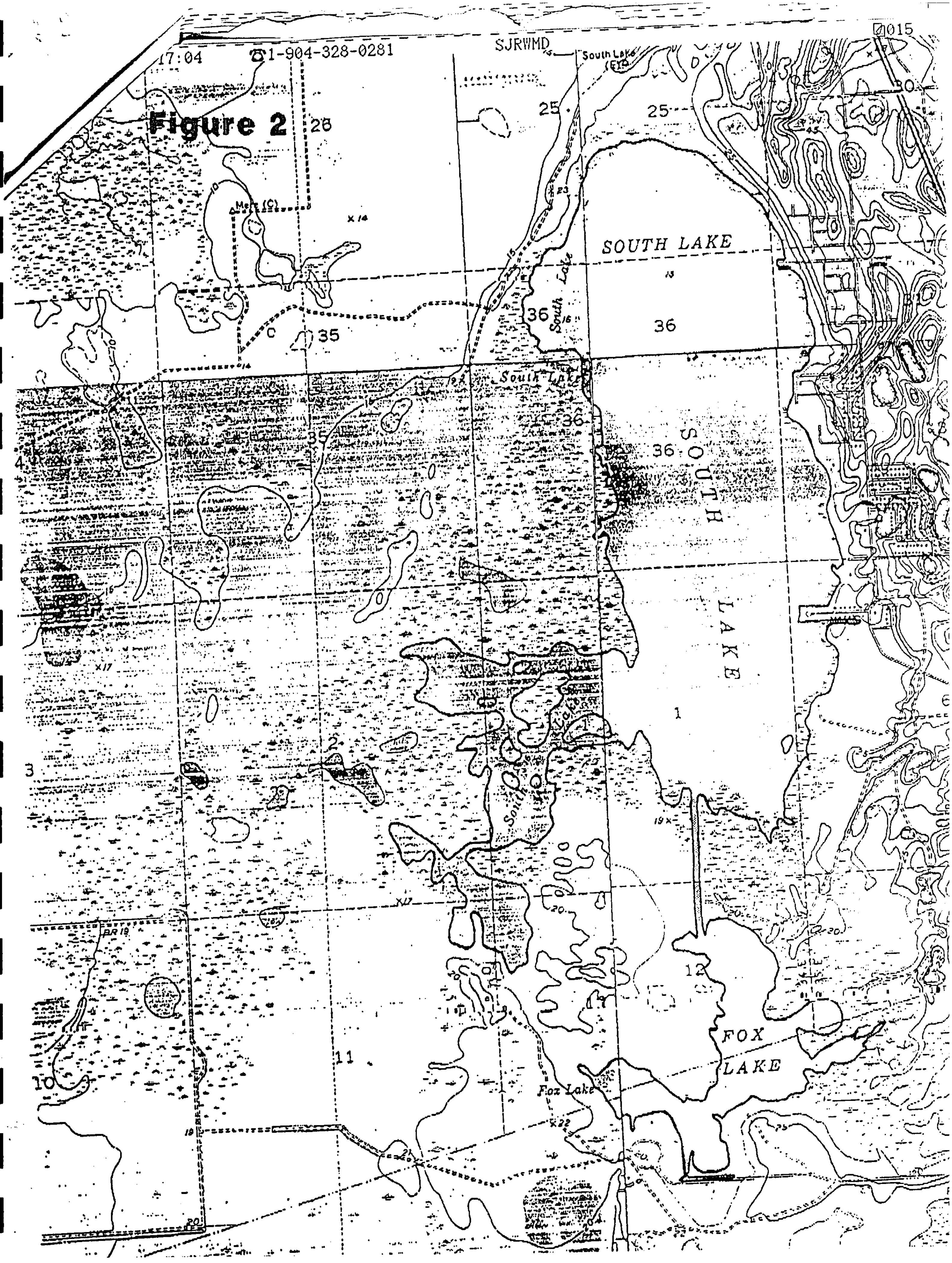
B. If a fathometer or similar automated measuring device is used during the survey, the following procedures must be followed:

<u>Bar Check Calibration:</u> A bar check calibration consists of lowering a flat steel plate, of length greater than the beam of the vessel and suspended by two calibrated lines attached one at each end, below the fathometer transducer foot. The bar is lowered to a known depth, and the calibration of the digital and/or analog sounding system is checked against the depth of the sounding bar. A bar check will be performed at a minimum of two depths at the beginning and end of each work day; when it becomes necessary to renew the fathometer chart paper during the survey; or upon moving to another project area during the same work day. The final reading of the calibration line should be $\pm$ 0.2 ft. of the initial readings. All calibration checks will be documented and clearly labeled on the analog recorder chart.

Figure 1


SPOIL BANK
29
35
36
BM
18
BM 22
Well
22
Well
32
RIVER
31
BM 20
ST JOHNS
500
192
5
6
2
Sawgrass Lake
17
SPOIL BANK
20
Little Sawgrass Lake
RAILROAD
GRADE
11
12
7
8
BM
21
22
North Indian Field
SPOIL BANK
21
17
RIVER
LEVEE
13
14
18
17
Well
17
Well
15

Figure 2


SOUTH LAKE
South Lake
SOUTH LAKE
FOX LAKE
Fox Lake
25
25
26
35
35
36
36
36
36
1
2
3
10
11
12

Squat Calibration: Squat calibration, the correction applied to compensate for the amount of vessel squat as a function of the vessel's velocity, must be determined for each vessel to be used during the survey. An acceptable procedure to determine the squat calibration for a vessel is discussed below. A transit is set on the shore. The vessel is positioned offshore in a static position, in calm water. A level rod is positioned on the hull over the transducer and the elevation is then determined. With the level rod still held at the same point on the vessel, the vessel is driven past the instrument at the various speeds at which surveys will be made and elevation differences noted for each speed. Only one squat calibration is required for each vessel used during the project.

Photoelectric Sounding Check: A photoelectric sounding device, provided by the District, will be used to compare the water depth reading recorded by the fathometer with the location of the "top" of the flocculent sediments, if present, at twenty randomly selected points on the sampling grid in each lake. District personnel will show the consultant the proper use of this device in the field. This information will be provided to the District in an appropriate table format.

Fathometer Recordings: The analog fathometer record is the prime backup to all recorded data and therefore it is the official source record. It is critical that this record be made as accurate as possible so that a survey can be easily and accurately reduced from the chart recordings. Positional information is essential. Location (fixes) should be annotated at least every 100 ft. of horizontal traverse.

C. If a sounding pole is used to determine depth to bottom, the end of the sounding pole will be equipped with a six inch disk to provide resistance to sediment penetration.

D. Mechanical and/or electronic stage recorders (0.01 ft. accuracy) will be established at a minimum of three widely separated points to make a plane of the lake surface. The vertical datum (NGVD) for each station will be determined and surface water levels will be recorded continuously for the duration of the project. Stilling wells, to dampen wave action, must be provided for each gauge deployed.

E. Permanent monumentation will be established for each stage recorder and trisponder location. Specifications for each site will be carefully documented and provided to the District for future reference.

F. From the field data obtained in part A, develop hydrographic and sediment depth maps (metric and foot scales) and stage-area-volume relationships (hypsographic curves) for each lake basin. Isopleth intervals should be 0.25 meter and 1.0 foot. All maps and figures produced will be of publication quality.

G. Quantitative analyses of errors in depth measurements due to precision of instruments and changes in lake surface water elevation will be made. Estimates of the accuracy of measuring water depth will be made by duplicating measurements at several of the grid points and conducting an analysis of variance to determine the accuracy of the measurements. At least one of the survey cross-sections will be resurveyed to produce several sets of duplicate grid points that will be compared following the calibration procedures and correction for water level variations. These data sets will be analyzed to determine the ninety-five percent confidence limits in measuring and correcting water depth to a known reference datum.

H. The successful respondent shall be required to coordinate efforts with District personnel working on the Minimum Flows and Levels Project, especially regarding sampling locations.

I. The contractor will provide a schedule for the field work and the production of a draft report. Three copies of a draft report on project services (items A through E) shall be delivered to the District within three months of the final sampling occasion. The draft report will be reviewed by District staff within 15 days of its receipt, and a copy will be returned with comments to the author(s). A final report incorporating all comments and /or modifications requested by the District will then be submitted within 30 days, for adoption by the District Governing Board.

J. All field data will be provided to the District in tabular form as a paper copy and in LOTUS format on 5 1/4 or 3 1/2 inch high density diskettes. These data files will contain the x, y, and z coordinates for all data collection points. The x and y coordinates can be either in state plane coordinates or latitude and longitude. The data will be segregated by lake and also by the type of data collected (ie. hydrographic data points, flocculent sediment depths, etc.). These data files and accompanied reports shall become the property of the District.

AGREED MODIFICATIONS TO THE PUBLISHED SCOPE OF WORK

In a meeting on-site at Fox Lake Park on August 30th, after an initial inspection of the lakes by Messrs. Ransome and Owens from Sunbelt, and Hall and Walters from SJRWMD, and in subsequent meetings on-site during the project and telecons between Ransome/Owens and Hall, the following modifications to the above scope of work were made verbally;

It was obvious that the situation with emergent vegetation in the lakes, particularly the cattails and myrtle oaks around the shoreline, was far worse than expected, a fact confirmed by Mr. Hall of SJRWMD. On August 30th a trip was made around both South and Fox lakes with District personnel to evaluate the practicability of getting close to shore. With lightly laden airboats it was possible to get close to shore, but stopping caused them to become stuck. In some areas patches of water could be seen, although the vegetation is highly concentrated under the surface. In other areas the cattails are so thick that the water surface cannot be seen even after the passage of the airboats. Concern was expressed that the survey airboat with its sensors deployed would not be able to push through. It was then decided that another boat would be used to flatten down line, and that, as far as possible, the District would supply an airboat and operator. When this was not possible Sunbelt would employ a second airboat. Two areas were still of concern because of their heavy growth extending some way from the old shoreline, these were the north end, and the western extension of South Lake.

It was agreed that two water level recorders would be sufficient if located at the cul-de-sac on South Lake, and at the boat ramp on Fox Lake Park.

SJRWMD agreed to make available to Sunbelt an aluminum sectional tower to be used on the project and to deliver it to Fox Lake Park.

In order to get more GPS points established it was agreed that SJRWMD personnel would be responsible for setting permanent markers for the GPS control points at sites agreed in advance with Sunbelt. It was also agreed to put in points with GPS on Sawgrass Lake and Lake Hell'n Blazes in addition to those required for South and Fox Lakes.

SJRWMD agreed to digitize the assumed "shoreline" of South and Fox lakes from existing aerial photographs from 1987, and to provide the data to Sunbelt on IBM PC compatible disk in ASCII format. It was realized that this may not accurately reflect the present day shoreline, but it was accepted as the basis to plan survey lines. This was done prior to starting hydrographic data acquisition and lines were submitted to SJRWMD for approval on October 11th.

At a meeting on South Lake on October 17th after 2 days of testing the fathometer and GPR on South/Fox and Sawgrass Lakes it was agreed that soil thickness would be measured by manual techniques and the question of whether or not to take fathometer data in the open lake areas was left for further testing. In a telecon (Ransome/Hall) on October 19th, Sunbelt reported that the fathometer was unable to read in water less than 3 to 4 feet in depth and, as a great deal of the lakes appeared to be this or less in depth, it was agreed to proceed on these specific lakes with full manual data acquisition to get the required data. Mr. Hall requested soil thicknesses at intervals along line no greater than 500 feet, and water depths no greater than 200 feet.

In a further telecon (Ransome/Hall) during the week of October 23rd, SJRWMD was informed that, in several areas in South Lake, it was impossible to get the heavily laden survey airboat up to the ideal shore line. At the point where the cattails thickened substantially, and/or where myrtle oaks had grown up, the lines were proposed to be terminated. Mr. Hall agreed that the last portions of these lines might be addressed by District survey personnel from land.

APPENDIX "B"

FDOT Horizontal Control

and

GPS Results

FORM 525
(9-18-80)

I 95

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

Quadrangle 280804

DESCRIPTION OF TRAVERSE STATION

GPS #013

NAME OF STATION: I19 73 B13 STATE: Florida COUNTY: Brevard

CHIEF OF PARTY: C.B. McGhin YEAR: 1973 DESCRIBED BY: G. Flavin

NOTE.* HEIGHT OF TELESCOPE ABOVE STATION MARK 1.77 METERS.† HEIGHT OF LIGHT ABOVE STATION MARK METERS.

1b SURFACE-STATION MARK,
7a UNDERGROUND-STATION MARK

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

NOTE	OBJECT	BEARING	DISTANCE FEET	DISTANCE METERS	DIRECTION‡ °	′	″
	I95 73 B12				0	00	00.0
11b	Reference Mark No. 1	ESE	74.22	22.625	267	17	38.8
(desc)	Reference Mark No. 3	SSE	68.66	20.927	323	02	08.2

Detailed description:

Station is located about 3 1/2 miles northwest of Titusville and about 3 miles south of Mims, on interstate Route 95 highway right-of-way.

To reach station from the Post Office at Titusville; go south on U.S. Route 1 for 1.9 miles to intersection of State Route 50. Turn right and go west on State Route 50 for 3.3 miles to intersection of Interstate Route 95. Turn right and go north on Interstate Route 95 for 4.95 miles to station on right, east side of northbound lane, southwest of a large school building and northwest of a housing development.

Station Mark is a standard Florida,Department of Transportation brass disk, stamped I95 73 B13, set in the top of a round concrete monument that is 6 inches below the ground. It is 4.4 feet west-southwest of a metal witness post, 30.8 feet east-northeast of center of Interstate Route 95 northbound lane and 68.7 feet north-northeast of a post for "north 95" sign.

Reference Mark Number 1 is a standard Florida, Department of Transportation brass disk, stamped I95 73 B13 RM NO 1, set in the top of a round concrete monument that is 3 inches below the ground. It is 2.6 feet west-southwest of a metal witness post, 3.6 feet west-southwest of right-of-way fence, 66.4 feet northeast of highway sign post (North 95) and 102.8 feet east-northeast of centerline of Interstate Route 95 northbound lane.

Reference Mark Number 3 is a standard Florida, Department of Transportation brass disk, stamped I95 73 B13 RM NO 3, set flush in a drill hole in top of concrete base of highway sign. It is 0.6 foot west of a metal post for "north 95" sign, 2.4 feet north of a metal witness post and 51.8 feet east-northeast of Interstate Route 95 northbound lane.

NOTE: Original set Reference Mark Number 2 could not be located. It is believed to be destroyed by construction. Reference Mark Number 3 was established but elevation was not determined.

Distance between Reference Mark Number 1 and Reference Mark Number 3 is 20.426 meters, or 67.01 feet.

#87

*Refers to notes in manuals of triangulation and state publications of triangulation. ‡Direction-angle measured clockwise, referred to initial station.
†To nearest meter only, when no trigonometric leveling is being done.

USCOMM-DC 27171-P89

FORM 525
(9-18-60)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

Quadrangle 280803

DESCRIPTION OF TRAVERSE STATION

GPS #052

NAME OF STATION: I95 73 A52 STATE: Florida COUNTY: Brevard

CHIEF OF PARTY: C. B. McGhin YEAR: 1973 DESCRIBED BY: G. Flavin

NOTE.* HEIGHT OF TELESCOPE ABOVE STATION MARK 1.83 METERS.† HEIGHT OF LIGHT ABOVE STATION MARK METERS.

NOTE.*	OBJECT	BEARING	DISTANCE FEET	DISTANCE METERS	DIRECTION‡ °	′	″
1b 7a	SURFACE-STATION MARK, UNDERGROUND-STATION MARK — DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION						
	I95 73 A51				0	00	00.0
(desc)	Reference Mark No. 2	WNW	25.44	7.757	112	37	21.2
(desc)	Reference Mark No. 1	ENE	25.44	7.757	267	07	10.4

Detailed description:

Station is located about 6 miles west of Melbourne and about 8 miles south-southeast of Palm Shores, at the intersection of U.S. Route 192 and Interstaste Route 95.

To reach station from the intersection of U.S. Route 1 and U.S. Route 192 in Melbourne; go west on U.S. Route 192 for 6.25 miles to intersection of Interstate Route 95 and station in median of Interstate Route 95 at south end of bridges.

Station Mark is a standard Florida, Department of Transportation brass disk, stamped I95 73 A52, set in the top of a round concrete monument that is 6 inches below the ground. It is 4.0 feet south of a metal witness post, 4.6 feet south of the headwall between bridges, 31.8 feet southeast of southeast corner of southbound lane bridge of Interstate Route 95 and 44.0 feet west of center of northbound lane of Interstate Route 95. EL= 49.227

Reference Mark Number 1 is a standard Florida, Department of Transportation brass disk, stamped I95 73 A52 RM NO1, set in a drill hole in headwall between bridges. It is 19.2 feet west of center of northbound lane of Interstate Route 95 and 11.3 feet south-southwest of southwest corner of the northbound lane bridge.

Reference Mark Number 2 is a standard Florida, Department of Transportation brass disk, stamped I95 73 A52 RM NO2, set in a drill hole in headwall between bridges. It is 11.3 feet south-southeast of southeast corner of southbound lane bridge and 19.4 feet east of center of southbound lane of Interstate Route 95.

Distance between Reference Mark Number 1 and Reference Mark Number 2 is 15.133 meters, or 49.64 feet.

EL= 49.127

I-95 Y-10 EL= 48.689

I-95 Z-10 EL= 48.532

FOUND 10/6/89

*Refers to notes in manuals of triangulation and state publications of triangulation. ‡Direction-angle measured clockwise, referred to initial station.
†To nearest meter only, when no trigonometric leveling is being done.

USCOMM-DC 27171-P69

FORM 525
(8-18-89)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

Quadrangle 280804

DESCRIPTION OF TRAVERSE STATION

NAME OF STATION: I95 73 B11 STATE: Florida COUNTY: Brevard

CHIEF OF PARTY: C. B. McGhin YEAR: 1973 DESCRIBED BY: G. Flavin

NOTE.* HEIGHT OF TELESCOPE ABOVE STATION MARK 1.62 METERS.† HEIGHT OF LIGHT ABOVE STATION MARK METERS.

(desc) SURFACE-STATION MARK, UNDERGROUND-STATION MARK

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

	OBJECT	BEARING	DISTANCE FEET	DISTANCE METERS	DIRECTION‡ °	′	″
	I95 73 B10				00	00	00.0
(desc)	Reference Mark No. 1	SW	16.34	4.983	61	42	11.9
(desc)	Reference Mark No. 2	NW	27.25	8.305	160	12	32.7

Detailed description:

Station is located about 3 miles west of Titusville and about 5 1/2 miles south of Mims, on the Fox Lake Road right-of-way at bridge over Interstate Route 95.

To reach station from the Post Office at Titusville; go south on U.S. Route 1 for 1.9 miles to intersection of State Route 50. Turn right and go west on State Route 50 for 3.3 miles to intersection of Interstate Route 95. Turn right and go north on Interstate Route 95 for 2.40 miles to the Fox Lake Road bridge over highway and station, at the west end of the bridge.

Station Mark is a standard Florida, Department of Transportation brass disk, stamped I95 73 B11, set flush in the top of the concrete slab of bridge decking. It is 3.6 feet north of the east face of bridge curb, 10.6 feet south of center of Fox Lake Road and 17.0 feet northeast of the southwest corner of the concrete bridge guardrail.

Reference Mark Number 1 is a standard Florida, Department of Transportation brass disk, stamped I95 73 B11 RM NO 1, set flush in drill hole in concrete guardrail of bridge. It is 0.6 foot east of southwest end of concrete bridge guardrail, 0.8 foot northeast of fence post and 18.9 feet south of center of Fox Lake Road.

Reference Mark Number 2 is a standard Florida, Department of Transportation brass disk, stamped I95 73 B11 RM NO 2, set flush in drill hole in concrete curbing of bridge. It is 3.8 feet west of an expansion joint, 6.2 feet south of base of concrete bridge guardrail and 14.7 feet north of center of Fox Lake Road.

Distance between Reference Mark Number 1 and Reference Mark Number 2 is 10.291 meters, or 33.76 feet.

HBF

*Refers to notes in manuals of triangulation and state publications of triangulation. ‡Direction-angle measured clockwise, referred to initial station.
†To nearest meter only, when no trigonometric leveling is being done.

USCOMM-DC 27171-P69

FORM 525
(9-18-59)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

Quadrangle 280804

DESCRIPTION OF TRAVERSE STATION

NAME OF STATION: I95 73 B10 STATE: Florida COUNTY: Brevard

CHIEF OF PARTY: C.B. McGhin YEAR: 1973 DESCRIBED BY: G. Flavin

NOTE.* HEIGHT OF TELESCOPE ABOVE STATION MARK 1.59 METERS.† HEIGHT OF LIGHT ABOVE STATION MARK METERS

(desc) SURFACE-STATION MARK, UNDERGROUND-STATION MARK — DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

NOTE	OBJECT	BEARING	DISTANCE FEET	DISTANCE METERS	DIRECTION‡ °	′	″
	I95 73 B09				0	00	00.0
11b	Reference Mark Number 1	NNE	49.28	15.021	198	14	09.3
11b	Reference Mark Number 2	SSE	48.38	14.746	341	17	13.4

Detailed description:

Station is located about 3 miles west-southwest of Titusville, about 11 miles northwest of Sharpes and about 12 3/4 miles northwest of Cocoa, on Interstate Route 95 highway right-of-way.

To reach station from the Post Office at Titusville; go south on U.S. Route 1 for 1.9 miles to intersection of State Route 50. Turn right and go west on State Route 50 for 3.3 miles to intersection of Interstate Route 95. Turn right and go north on Interstate Route 95 for 1.0 mile to station, in median near center of a large double drop inlet.

Station Mark is a standard Florida, Department of Transportation brass disk, stamped I95 73 B10, set flush in a drill hole in top of center of concrete drop inlet. It is 1.7 feet west of east edge of drop inlet, 19.6 feet south of north edge of drop inlet and 41.9 feet west of center of Interstate Route 95 northbound lane.

Reference Mark Number 1 is a standard Florida, Department of Transportation brass disk, stamped I95 73 B10 RM NO 1, set in the top of a round concrete monument that is 2 inches below the ground. It is 3.8 feet east of a metal witness post, 25.8 feet west of center of Interstate Route 95 northbound lane and 30.6 feet northeast of the northeast corner of drop inlet.

Reference Mark Number 2 is a standard Florida, Department of Transportation brass disk, stamped I95 73 B10 RM NO 2, set in the top of a round concrete monument that is 7 inches below the ground. It is 2.0 feet east of a metal witness post, 26.4 feet west of center of Interstate Route 95 northbound lane and 30.4 feet southeast of the southeast corner of drop inlet.

Distance between Reference Mark Number 1 and Reference Mark Number 2 is 28.246 meters, or 92.67 feet.

J. Owens 10/5/89 FOUND B10 & Ref monuments

*Refers to notes in manuals of triangulation and state publications of triangulation. ‡Direction-angle measured clockwise, referred to initial station.
†To nearest meter only, when no trigonometric leveling is being done.

USCOMM-DC 27171-P59

Quadrangle 280804

DESCRIPTION OF TRAVERSE INTERSECTION STATION

NAME OF STATION: SOUTHERN BELL MICROWAVE TR

CHIEF OF PARTY: C.B.McGhin YEAR: 1973 STATE: Florida COUNTY:Bre

DESCRIPTION:

Southern Bell, Omni-Directional Microwave Tower is a 4 legged steel structure with 4 microwave antennas a top. It is painted in alternate red and white sections. There is a concrete block structure at base of tower, housing communications equipment.

Tower is located at the intersection of Fox Lake Road and Carpenter Road, west of Titusville.

Point intesected was the red light a top.

G. Flemi[illegible]

SOUTH LAKE

KEITH & SCHNARS, LAKELAND - T.M. JENNINGS, P.L.S.
NORTH PT.'S, TITUSVILLE HYDRO GPS CONTROL - FIXED ADJ
A= 6378206.400 B= 6356583.800 X0= 0.000 Y0= 0.000 Z0= 0.00

ELLIPSE: STATION ACCURACY

2-D AND 1-D STATION CONFIDENCE REGIONS (95.000 %): (READINGS IN FEET)

IDENT.	MAJOR SEMI-AXIS	MINOR SEMI-AXIS	AZ(MAJ)	VERTICAL
01062822 (SL3)	0.0027	0.0016	16.29	0.0051
01052822 (FL3)	0.0025	0.0015	17.54	0.0049
01042822 (SL1)	0.0026	0.0015	19.11	0.0050

GPS Site #

KEITH & SCHNARS, LAKELAND - T.M. JENNINGS, P.L.S.
NORTH PT.'S, TITUSVILLE HYDRO GPS CONTROL - FIXED ADJ
A= 6378206.400 B= 6356583.800 X0= 0.000 Y0= 0.000 Z0= 0.00

ELLIPSE: BASELINE MEASUREMENTS

2-D AND 1-D RELATIVE STATION CONFIDENCE REGIONS (95.000 %): (READINGS IN FEET)

FROM	TO	MAJ.SEMI	MIN.SEMI	AZ(MAJ)	VERTICAL	SPATIAL DIST.	PRECISION
01062822	01052822	0.0023	0.0012	18.63	0.0041	1061.6105	2.134 PPM
01062822	01042822	0.0027	0.0014	18.17	0.0047	3788.6930	0.712 PPM
01052822	01042822	0.0025	0.0014	18.64	0.0047	3441.5468	0.726 PPM

ELLIPSE successfully completed.

GPS Site #

FOX LAKE

KEITH & SCHNARS, LAKELAND - T.M. JENNINGS, P.L.S.
SOUTH PT.'S TITUSVILLE HYDRO GPS CONTROL - FIXED ADJ.
A= 6378206.400 B= 6356583.800 XO= 0.000 YO= 0.000 ZO= 0.000

ELLIPSE: STATION ACCURACY

2-D AND 1-D STATION CONFIDENCE REGIONS (95.000 %): (READINGS IN FEET)

IDENT.	MAJOR SEMI-AXIS	MINOR SEMI-AXIS	AZ(MAJ)	VERTICAL
01032821 (SL28)	0.0311	0.0150	41.64	0.0286
01022821 (FL2)	0.0374	0.0185	43.91	0.0452
01012821 (FL1)	0.0397	0.0194	43.39	0.0474

GPS Site #

KEITH & SCHNARS, LAKELAND - T.M. JENNINGS, P.L.S.
SOUTH PT.'S TITUSVILLE HYDRO GPS CONTROL - FIXED ADJ.
A= 6378206.400 B= 6356583.800 XO= 0.000 YO= 0.000 ZO= 0.00

ELLIPSE: BASELINE MEASUREMENTS

2-D AND 1-D RELATIVE STATION CONFIDENCE REGIONS (95.000 %): (READINGS IN FEET)

FROM	TO	MAJ.SEMI	MIN.SEMI	AZ(MAJ)	VERTICAL	SPATIAL DIST.	PRECISIO
01032821	01022821	0.0323	0.0161	46.09	0.0425	2035.5755	15.863 PP
01032821	01012821	0.0348	0.0170	45.70	0.0446	2731.8921	12.756 PP
01022821	01012821	0.0287	0.0140	45.35	0.0329	1080.7825	26.562 PP

ELLIPSE successfully completed.

GPS Site #

SAWGRASS LAKE

KEITH & SCHNARS, LAKELAND - T.M. JENNINGS, P.L.S.
SAWGRASS LAKE GPS CONTROL

A= 6378206.400 B= 6356583.800 XO= 0.000 YO= 0.000 ZO= 0.000

ELLIPSE: Station Accuracy

2-D AND 1-D STATION CONFIDENCE REGIONS (95.000 %): (Readings In Feet)

IDENT.	MAJOR SEMI-AXIS	MINOR SEMI-AXIS	AZ(MAJ)	VERTICAL
04032832 (SA3)	0.0443	0.0301	46.29	0.0638
04022832 (SA2)	0.0438	0.0291	47.74	0.0615
04012832 (SA1)	0.0451	0.0292	45.28	0.0620

GPS Site #

KEITH & SCHNARS, LAKELAND - T.M. JENNINGS, P.L.S.
SAWGRASS LAKE GPS CONTROL

A= 6378206.400 B= 6356583.800 XO= 0.000 YO= 0.000 ZO= 0.000

ELLIPSE: Baseline Measurements

2-D AND 1-D RELATIVE STATION CONFIDENCE REGIONS (95.000 %): (Readings In Feet)

FROM	TO	MAJ.SEMI	MIN.SEMI	AZ(MAJ)	VERTICAL	SPATIAL DIST.	PRECISION
04032832	04022832	0.0119	0.0100	37.28	0.0206	1500.5865	7.936 PPM
04032832	04012832	0.0168	0.0114	43.73	0.0199	2401.1727	6.982 PPM
04022832	04012832	0.0143	0.0063	35.25	0.0138	908.4632	15.716 PPM

ELLIPSE successfully completed.

GPS Site #

KEITH & SCHNARS, LAKELAND - T.M. JENNINGS, P.L.S.
LAKE HELEN BLAZES HYDRO GPS CONTROL
A= 6378206.400 B= 6356583.800 X0= 0.000 Y0= 0.000 Z0= 0.000

ELLIPSE: STATION ACCURACY

2-D AND 1-D STATION CONFIDENCE REGIONS (95.000 %): (READINGS IN FEET)

IDENT.	MAJOR SEMI-AXIS	MINOR SEMI-AXIS	AZ(MAJ)	VERTICAL
03032831 (HB3)	0.0237	0.0149	112.82	0.0271
03022831 (HB2)	0.0234	0.0152	112.21	0.0274
03012831 (HB1)	0.0373	0.0151	117.22	0.0282

GPS Site #

KEITH & SCHNARS, LAKELAND - T.M. JENNINGS, P.L.S.
LAKE HELEN BLAZES HYDRO GPS CONTROL
A= 6378206.400 B= 6356583.800 X0= 0.000 Y0= 0.000 Z0= 0.000

ELLIPSE: BASELINE MEASUREMENTS

2-D AND 1-D RELATIVE STATION CONFIDENCE REGIONS (95.000 %): (READINGS IN FEET)

FROM	TO	MAJ.SEMI	MIN.SEMI	AZ(MAJ)	VERTICAL	SPATIAL DIST.	PRECISION
03032831	03022831	0.0051	0.0032	64.73	0.0074	735.1085	6.904 PPM
03032831	03012831	0.0293	0.0039	119.42	0.0100	1832.8280	15.978 PPM
03022831	03012831	0.0296	0.0043	118.23	0.0106	1394.2117	21.211 PPM

ELLIPSE successfully completed.

GPS Site #

APPENDIX "C"

FDOT Levelling Data

LE 7 miles West of Sharpes to 12 miles North of Titusville, Fla. HGZ L- 6

EF OF PARTY H.B. Forehand COMPUTERS ______ DATES OF LEVELING: FROM 8-7-73 TO 8-23-73 Second ORDER SHEET 3 OF 6

ERVER J.M. Bowles LEVEL NA2 188482 RODS 2132A & 2132B

TIME	TEMP. OF RODS	F OR B	DIFFERENCE OF ELEVATION EACH RUNNING	B - F Δ AND Σ	CORRECTIONS LEVEL	ROD	TEMP.	DESIGNATION OF SECTION	DISTANCE EACH RUNNING	Σ	MEAN DIFFERENCE	FIELD ELEVATION B.M.	LATITUDE	CO
	°CENT		METERS	TENTHS OF MM	TENTHS OF MM				KM		METERS	METERS	FIELD ELEVATIONS FEET	
1412		F	-1.0344					I95 Q12	1.21					
								I9573B08RM1		13.43	-1.0344	5.3620	17.	562
1448		F	-0.0092					I9573B08 RM1	.02					
								I9573B08		13.45	-0.0092	5.3528	17.	562
1454		F	-0.0714					I9573B08	.02					
								I9573B08RM2		13.47	-0.0714	5.2814	17.	327
1505		F	+6.5686					I9573B08RM2	1.37					
								I9573B09		14.84	+6.5686	11.8500	38.	878
								SR. 50						
1547		F	+0.0889					I9573B09	.02					
								I95R12		14.86	+0.0889	11.9389	39.	170
1550		F	+0.8634					I95R12	.03					
								I9573B09RM1		14.89	+0.8634	12.8023	42.	002
1554		F	-0.0259					I9573B09 RM1	.02					
0830		B	+0.0264					I9573B09-RM2	.02	14.91	-0.0262	12.7761	41.	916
0835		F	-0.8383					I9573B09 RM2	.08					
								I95S12		14.99	-0.8383	11.9378	39.	166
0840		F	-6.3184					I95S12	1.43					
								I9573B10 RM2		16.42	-6.3184	5.6194	18.	436
0945		F	-0.8094					I9573B10 RM2	.02					
								I9573B10		16.44	-0.8094	4.8100	15.	781
0947		F	+0.9430					I9573B10	.02					
								I9573B10 RM1		16.46	+0.9430	5.7530	18.	875
0950		F	-0.2230					I9573B10RM1	.81					
								I95T12		17.27	-0.2230	5.5300	18.	143
1020		F	+7.5548					I95T12	1.53					
								* I9573B11		18.80	+7.5548	13.0848	42.	929
1132		F	+0.6845					I9573B11	.02					
								I9573B11 RM1		18.82	+0.6845	13.7693	45.	175
1138		F	-0.5128		Fort Lake Road			I9573B11 RM1	.01					
0940		B	+0.5126					I9573B11 RM2	.01	18.83	-0.5127	13.2566	43.	493

C&GS-458

ABSTRACT OF PRECISE LEVELING

U.S. DEPARTMENT OF
ENVIRONMENTAL SCIENCE SERVICES ADMIN
COAST AND GEODET

LE 4 miles west of Sharpes to 12 miles North of Titusville Fla   HGZ L- 6

EF OF PARTY H.B. Forehand   COMPUTERS ____   DATES OF LEVELING: FROM 8-7-73 TO 8-23-73   second -ORDER   SHEET 4 OF 6

ERVER J. M. Bowles   LEVEL NA2 188482   RODS 2132A & 2132B

TIME	TEMP. OF RODS (°CENT)	F OR B	DIFFERENCE OF ELEVATION EACH RUNNING (METERS)	B - F Δ AND Σ (TENTHS OF MM.)	CORRECTIONS LEVEL	ROD	TEMP. (TENTHS OF MM)	DESIGNATION OF SECTION	DISTANCE EACH RUNNING (KM)	Σ	MEAN DIFFERENCE (METERS)	FIELD ELEVATION B.M. (METERS)	LATITUDE	CO (TENTH)
													FIELD ELEVATIONS FEET	
		F						I9573B11 RM2						
0230		B	+6.1241					I95 U12	1.87	20.70	−6.1241	7.1325	23.	401
1040		F	+5.5692					I95 U12	.80					
								I9573B12RM1		21.50	+5.5692	12.7017	41.	672
1106		F	+0.8186					I9573B12RM1	.02					
								I9573B12		21.52	+0.8186	13.5203	44.	358
1108		F	−1.2395					I9573B12	.02					
								I9573B12 RM2		21.54	−1.2395	12.2808	40.	291
1110		F	−1.6616					I9573B12 RM2	1.45					
								I9573B13 RM2		22.99	−1.6616	10.6192	34.	840
1335		F	+0.5062					I9573B13 RM2	.02					
								I9573B13 RM1		23.01	+0.5062	11.1254	36.	501
1340		F	+0.0361					I9573B13 RM1	.03					
							*	I9573B13		23.04	+0.0361	11.1615	36.	619
1344		F	+3.2294					I9573B13	1.81					
								I9573 B15		24.85	+3.2294	14.3909	47.	214
1450		F	−0.0896					I9573B15	.01					
								I9573B15 RM2		24.86	−0.0896	14.3013	46.	920
1454		F	+0.3416					I9573B15 RM2	.02					
								I9573B15 RM1		24.88	+0.3416	14.6429	48.	041
1456		F	−9.4432					I9573B15 RM1	1.71					
								I9573B16 RM2		26.59	−9.4432	5.1997	17.	059
1618		F	+1.1070					I9573B16 RM2	.03					
								I9573B16		26.62	+1.1070	6.3067	20.	691
1624		F	−1.1260					I9573B16	.03					
0826		B	+1.1258					I9573B16 RM1	.03	26.65	−1.1259	5.1808	16.	997
0832		F	+6.9319					I9573B16 RM1	1.69					
								I95 V12		28.34	+6.9319	12.1127	39.	740
0927		F	+0.8586					I95 V12	.03					
							SR46	I9573B17 RM2		28.37	+0.8586	12.9713	42.	557

APPENDIX "D"

Field Notes for Horizontal

and Vertical Control

CRA - SUNBELT SURVEYORS, INC.
HYDROGRAPHIC SURVEY
OF
SOUTH & FOX LAKES
IN SECTIONS 25 & 36, TWP. 21 S., RGE 34 E
SEC. 30 & 31, T 21 S, R 35 E
SEC. 1, 2, 11 & 12, T 22 S, R 34 E
SEC 6 & 7, T 22 S, R 35 E
BREVARD CO. FLORIDA
ALSO
GPS SURVEY
TO ESTABLISH CONTROL
IN SAID AREAS
FOR:
ST. JOHNS RIVER WATER MANAGEMENT
DISTRICT

MILLARD L. CUTLER, P.E., PLS #2962
CHRIS RANSOME, PROJECT MNGR.
JIM OWENS, PARTY CHIEF
ROB FLANCE, SENIOR SURVEY TECH
PAUL BERENGUER, INSTRUMENT MAN.
TRIMBLE NAV. 4000 GPS RECIEVERS & SOFTWARE
WILD T-2 THEODOLITE SERIAL # 287829
WILD NA2 LEVEL SERIAL # 502289
GEODIMETER 112 EDM S# 23741
TOPCON GTS-2B S# CR1826
LASER TRACK & TELEMETRY (MDL)
HP 9816 w/9121 DISK DRIVE COMPUTER.
CRA NAVIGATION SOFTWARE.

- INDEX -

INDEX (CONT.)

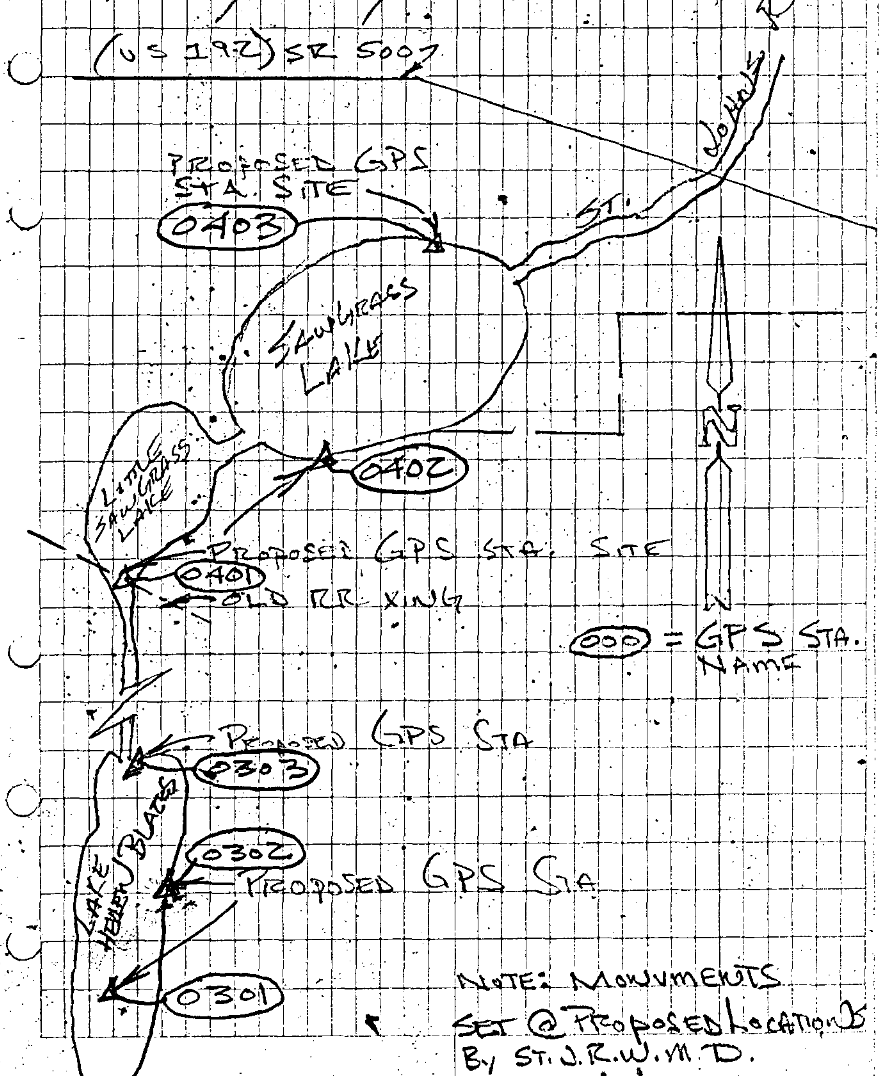
1

J. OWENS 10/2/89

S. HALL

T. WALTERS

PTLY CLOUDY - RAINY



NOTE: MONUMENTS SET @ PROPOSED LOCATIONS BY ST. J.R.W.M.D.

(1A)

10/10/89, Rainy GPS Survey

J. Owens
C. Ransome } CRA
P. Berenguer

S. Hall
T. Walters } SJRWMD w/ AirBoats
Mike

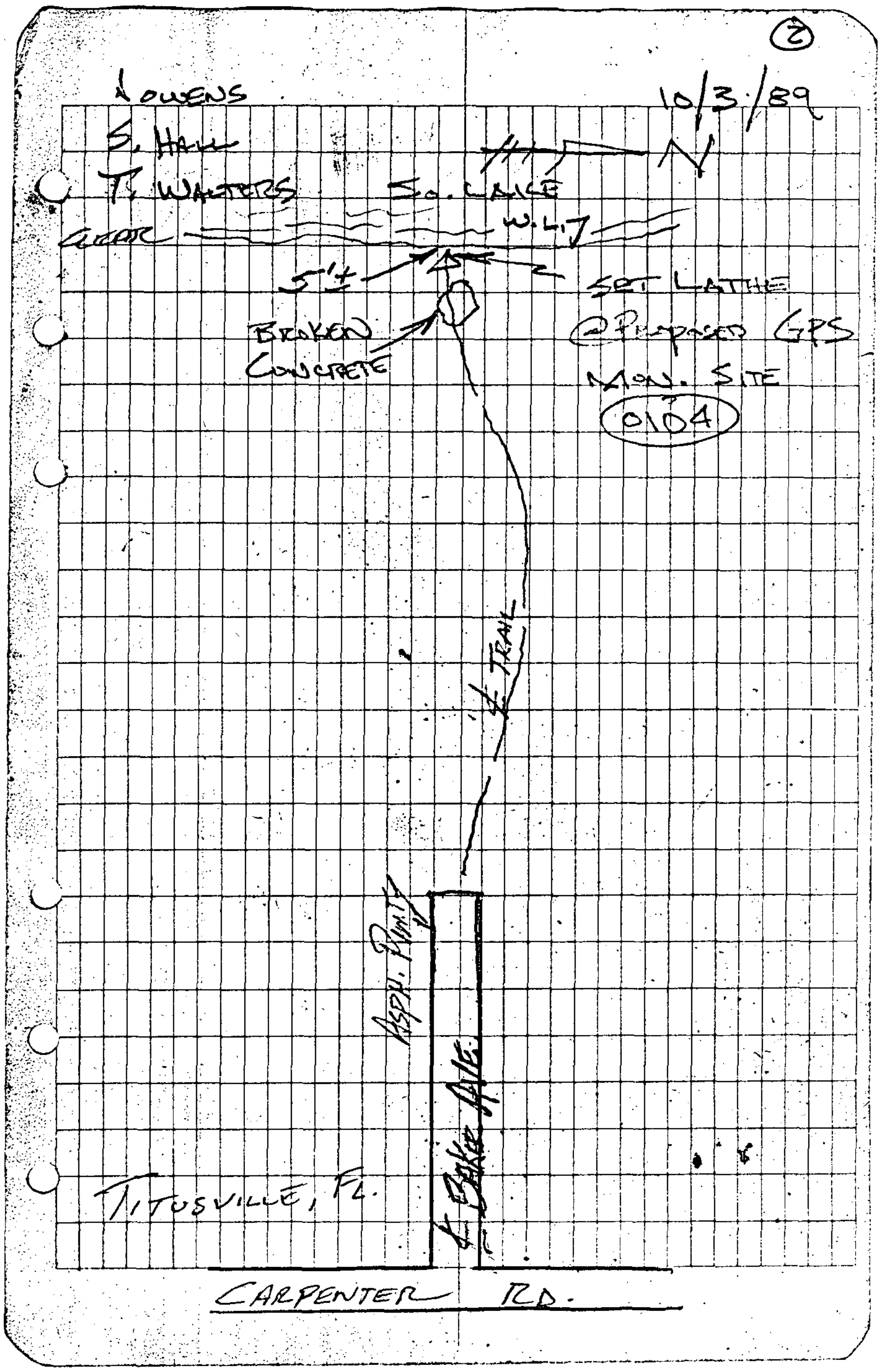
Launched Air Boats
@ Sawgrass Lake
& Lake Helen Blazes
For GPS Survey

Session A: 14:05 - 1605 (GMT)
occupied 0301, 0302, 0303
& I9573A52 (0052)

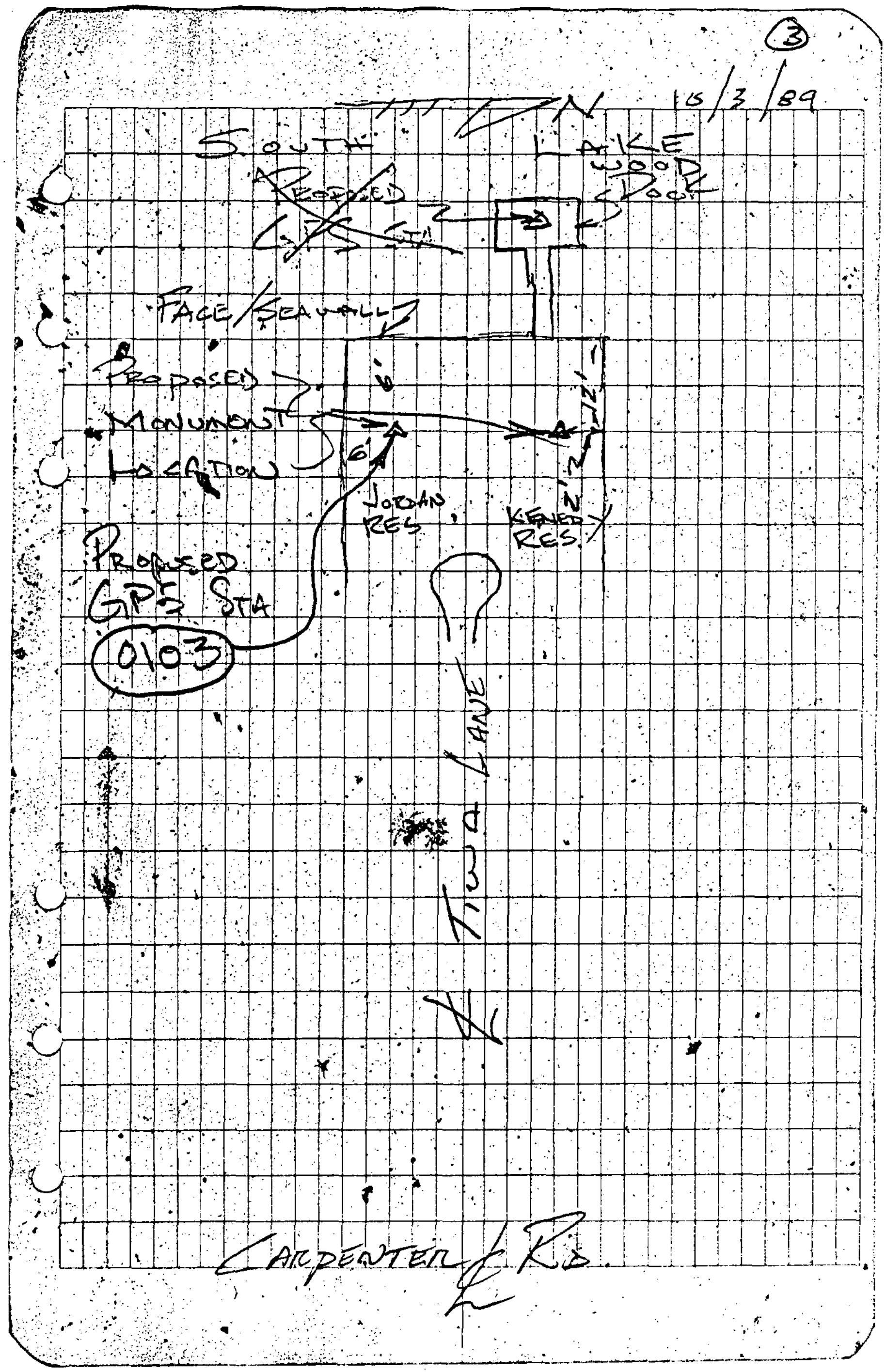
Satellites: 2, 6, 9, 11, 12, 13, 14

Session B: 1705 - 1905 (GMT)
occupied: 0401, 0402, 0403 & 0052

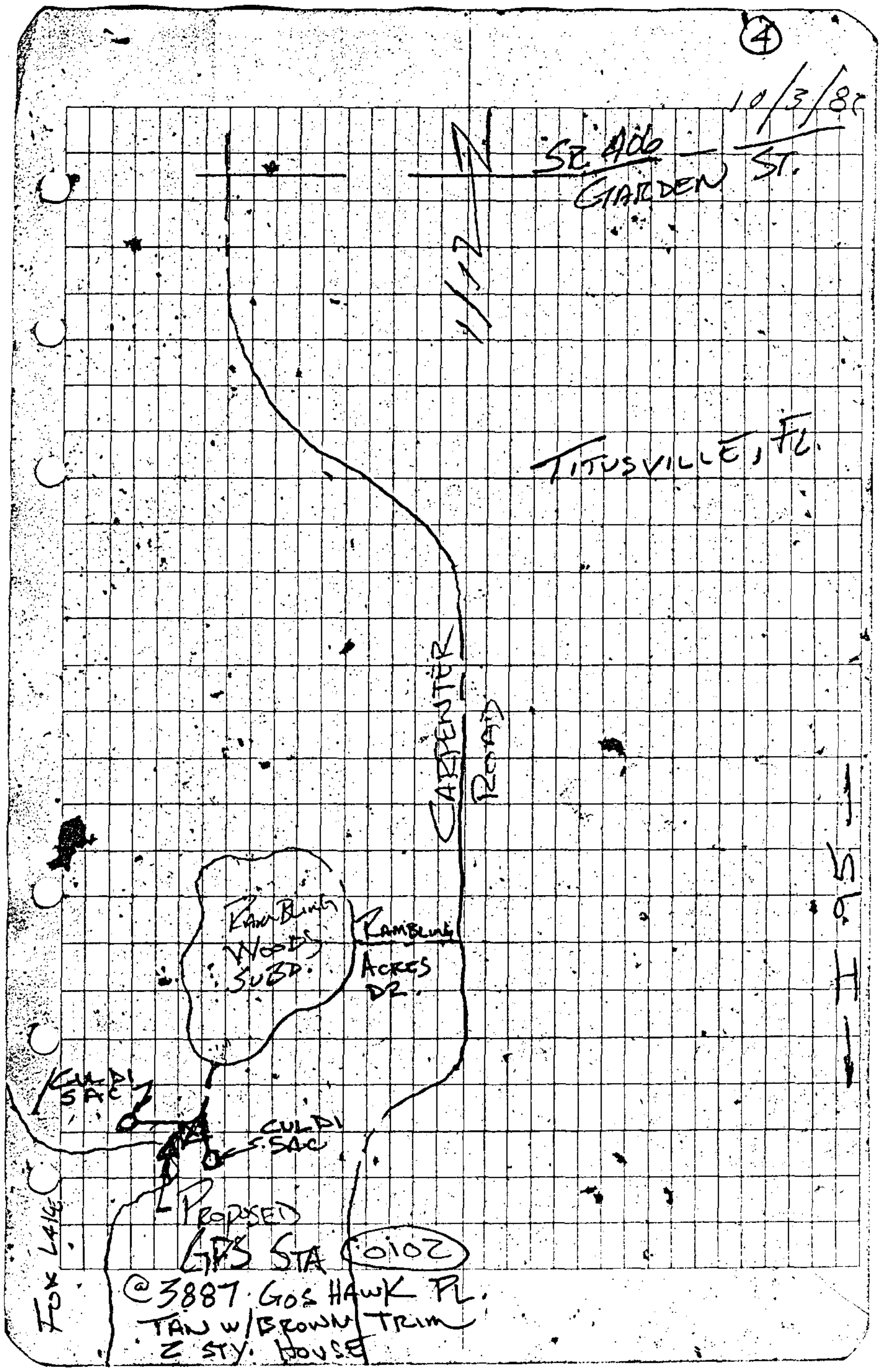
SAT.: 3, 9, 11, 12, 13, 14



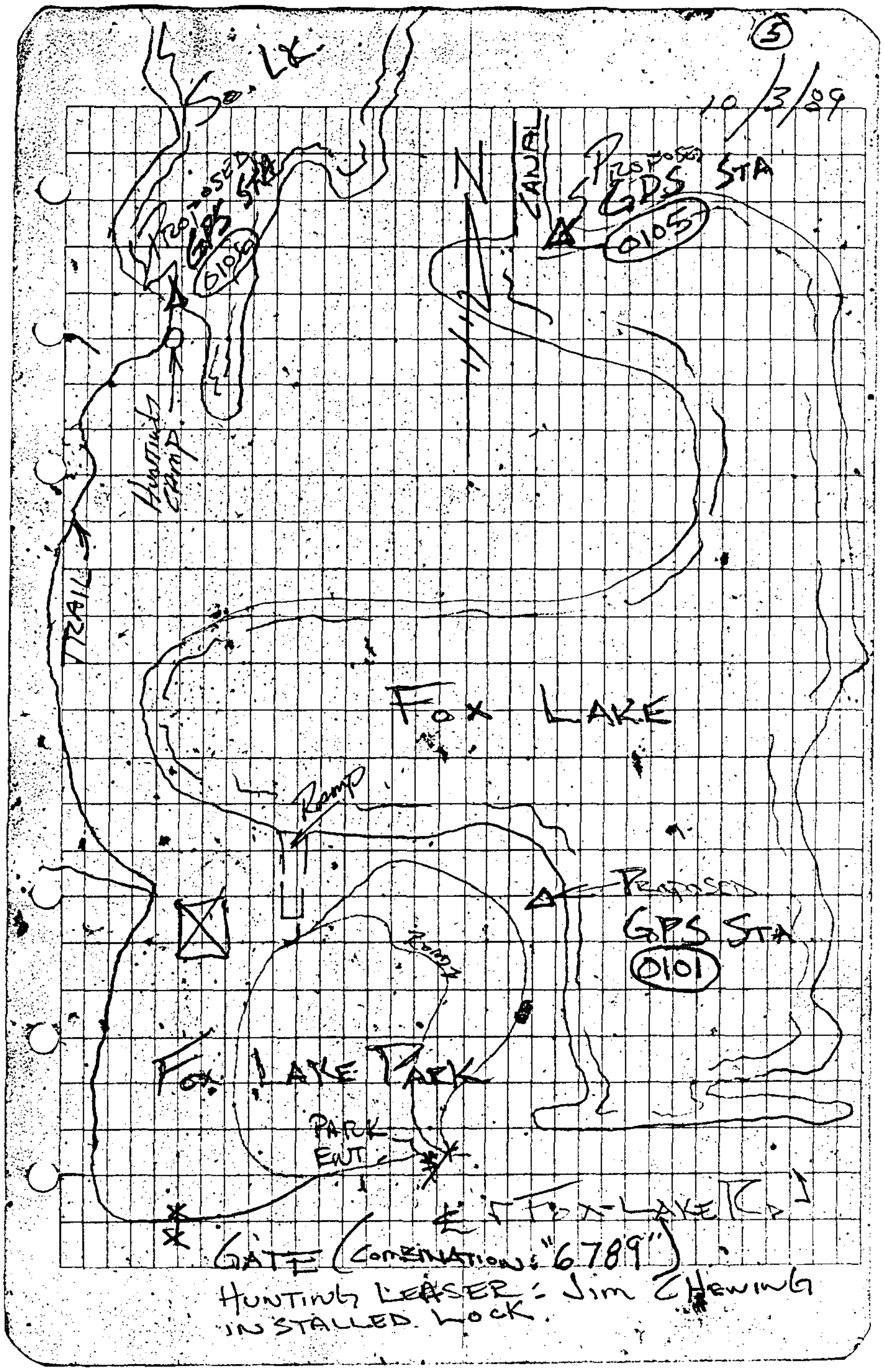
②
J. OWENS
S. HALL
T. WALTERS
10/3/89
N
SO. LAKE
W.L.
CLEAR
5'±
2'±
SET LATHE
@ PROPOSED GPS
MON. SITE
0104
BROKEN
CONCRETE
℄ TRAIL
ASPH. PVMT.
℄ BAKER AVE.
TITUSVILLE, FL.
CARPENTER RD.



3
10/3/89
SOUTH
LAKE
WOOD
DOCK
FACE/SEAWALL
PROPOSED
MONUMENT
LOCATION
6'
6'
12'
12'
JORDAN RES.
KENEDY RES.
PROPOSED
GPS STA
0103
TIWA LANE
CARPENTER RD



4
SR 406
GARDEN ST.
TITUSVILLE, FL.
CARPENTER ROAD
RAMBLING WOODS SUBD.
RAMBLING ACRES DR.
CUL DI SAC
CUL DI SAC
PROPOSED GPS STA 0102
@3887 GOS HAWK PL.
TAN W/BROWN TRIM
2 STY. HOUSE
FOX LAKE

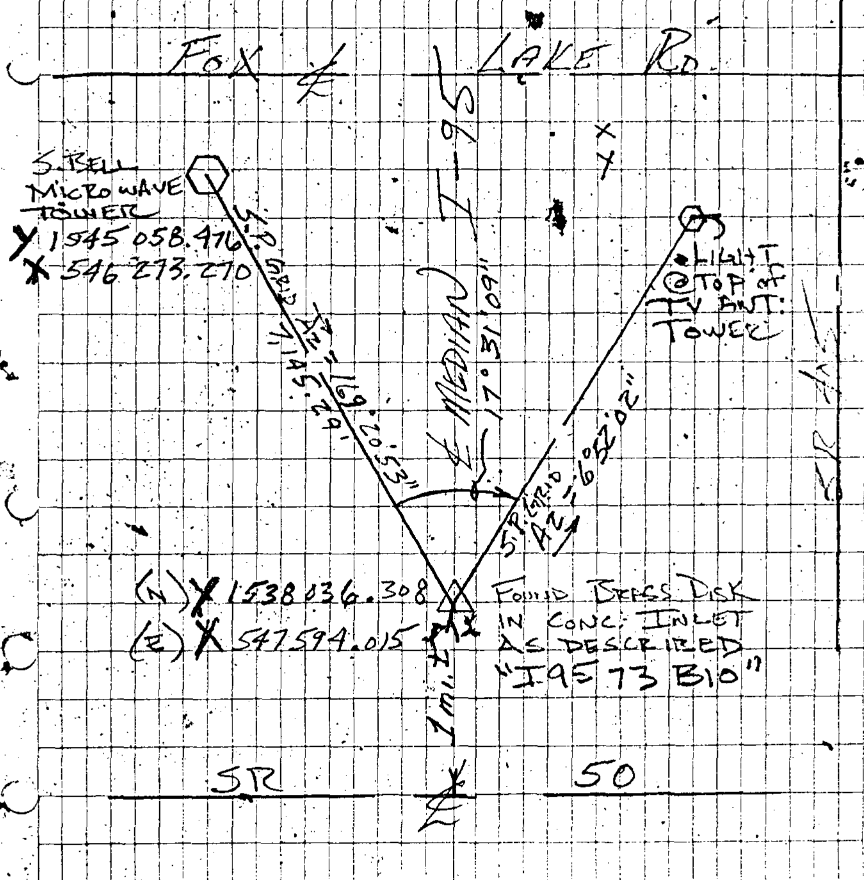

5
10/3/09
So. LK
PROPOSED GPS STA
6106
PROPOSED GPS STA
0105
CANAL
N
HUNTING CAMP
TRAIL
FOX LAKE
Ramp
PROPOSED
GPS STA
0101
FOX LAKE PARK
PARK ENT
FOX LAKE Rd
GATE (COMBINATION: "6789")
HUNTING LEASER: Jim Chewing
INSTALLED LOCK.

10/5/89
CLEAR, HOT

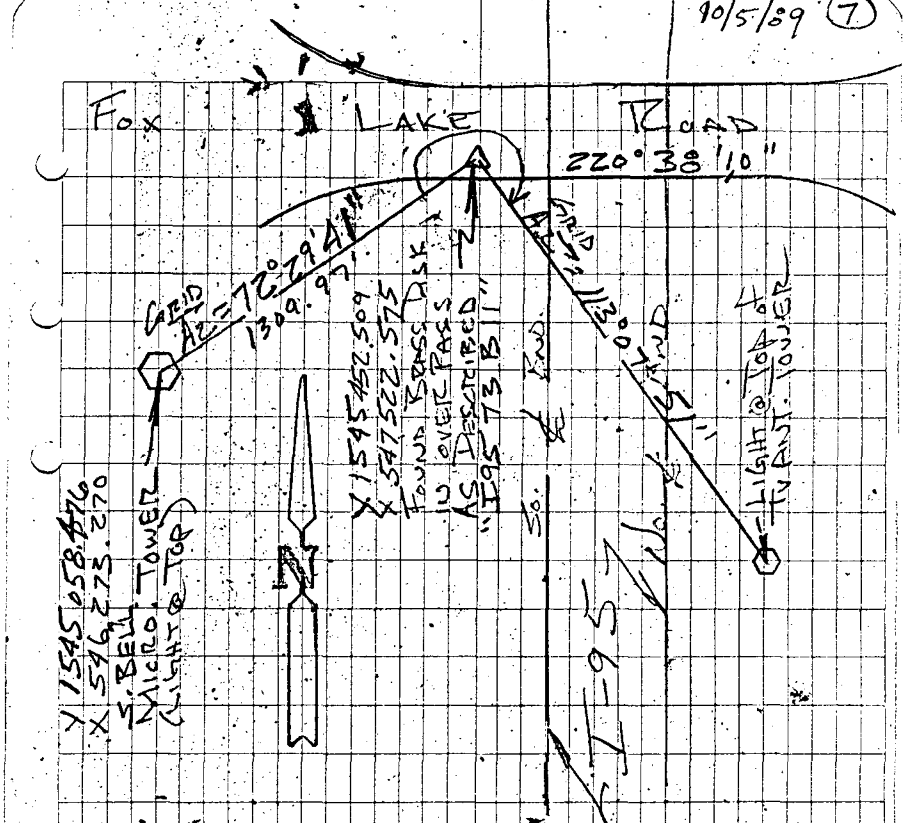
J. OWENS ; ∅
P. BERENGUER

@ "I95 73 B10" ; BS. S. BELL MICRO TOWER (LIGHT @ TOP)
X RT TO TV ANT. TOWER (LIGHT @ TOP)

BS D 00°00'10" > 17°31'08"
FS D 17°31'18"
FS R 197°31'20" > 17°31'11" > 17°31'09"
BS R 180°00'09"



10/5/89 (7)



⊼@ "I95 73 B11" ; BS S. BELL MICRO TOWER (LIGHT @ TOP)

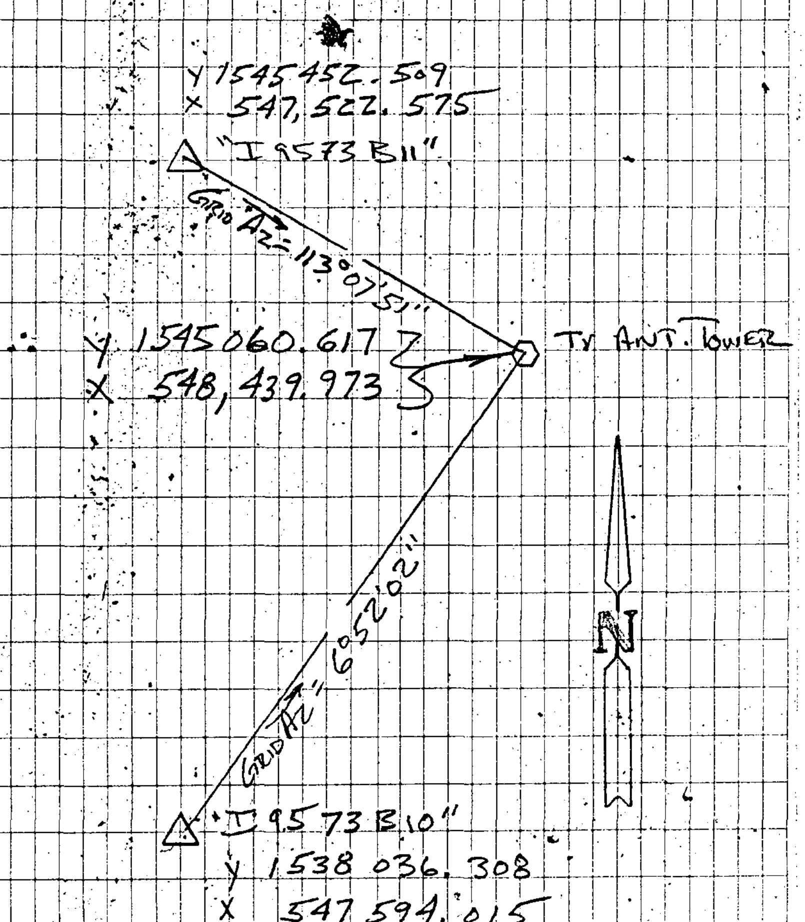
∢RT TO TV ANT. TOWER (LIGHT @ TOP)

BS D 00° 00' 10" > 220° 38' 01"
FS D 220° 38' 11" > 220° 38' 10"
FS R 40° 38' 21" > 220° 38' 19"
BS R 180° 00' 02"

(8)

10/5/89

BEARING - BEARING INT.
TO ESTABLISH S.P. COORDS
ON TV ANT. TOWER (LIGHT @ TOP)



NOTE: ALL COORDS SHOWN HERE ON
ARE NAD '27 PER FDOT PUBLICATION.
FL. EAST

(9)

J. OWENS M.T.
P. BERENGUER Ø

10/6/89
CLEAR

BENCH RUN TO ESTABLISH
VERTICAL CONTROL @ SOUTH LAKE
FOR WATER LEVEL RECORDER

RECEIVED COPY OF VERTICAL
CONTROL MAP IN VICINITY
OF TIWA LANE & CARPENTER RD
FROM TOM SNYDER @ CITY
OF TITUSVILLE ENG. DEPT.
NGVD 1929.
SAID BM RUN IN FROM
FDOT CONTROL ON I95.

OVER FOR BENCH RUN →

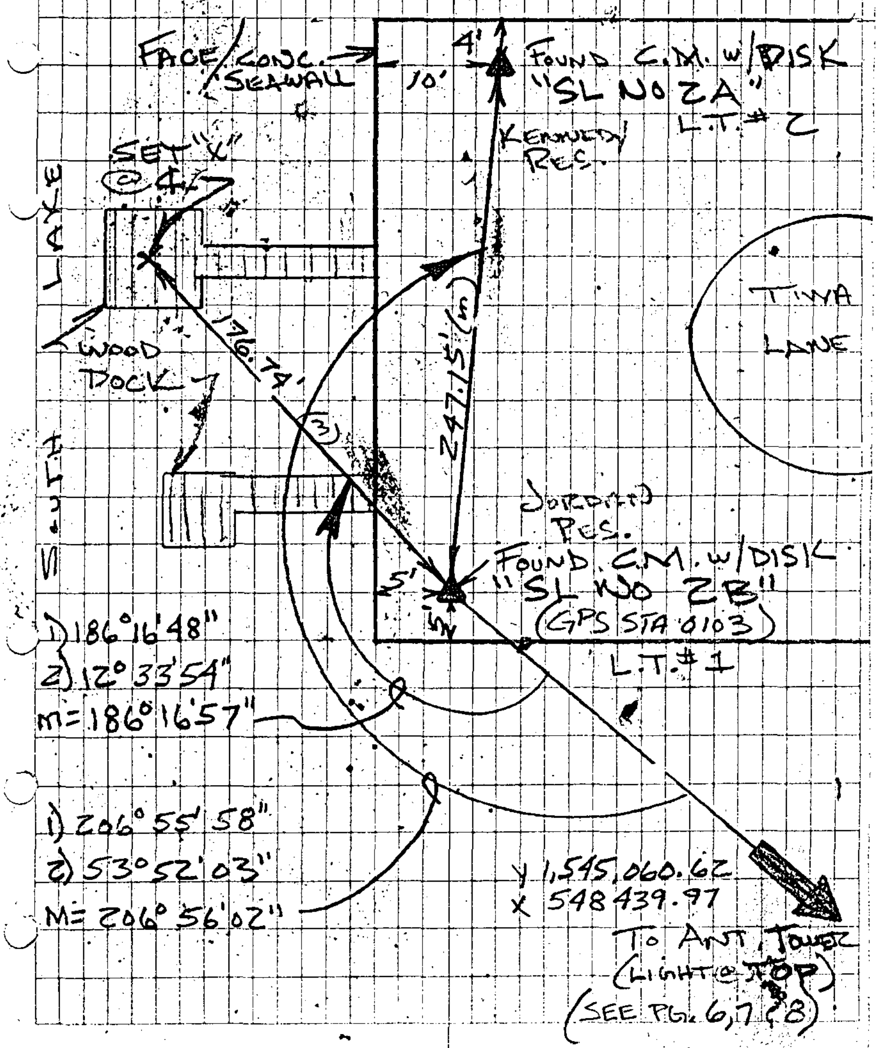
(94) 3 WIRE LEVEL RUN (1 WAY)

NOTE! SEE PG 17-18 THIS BOOK

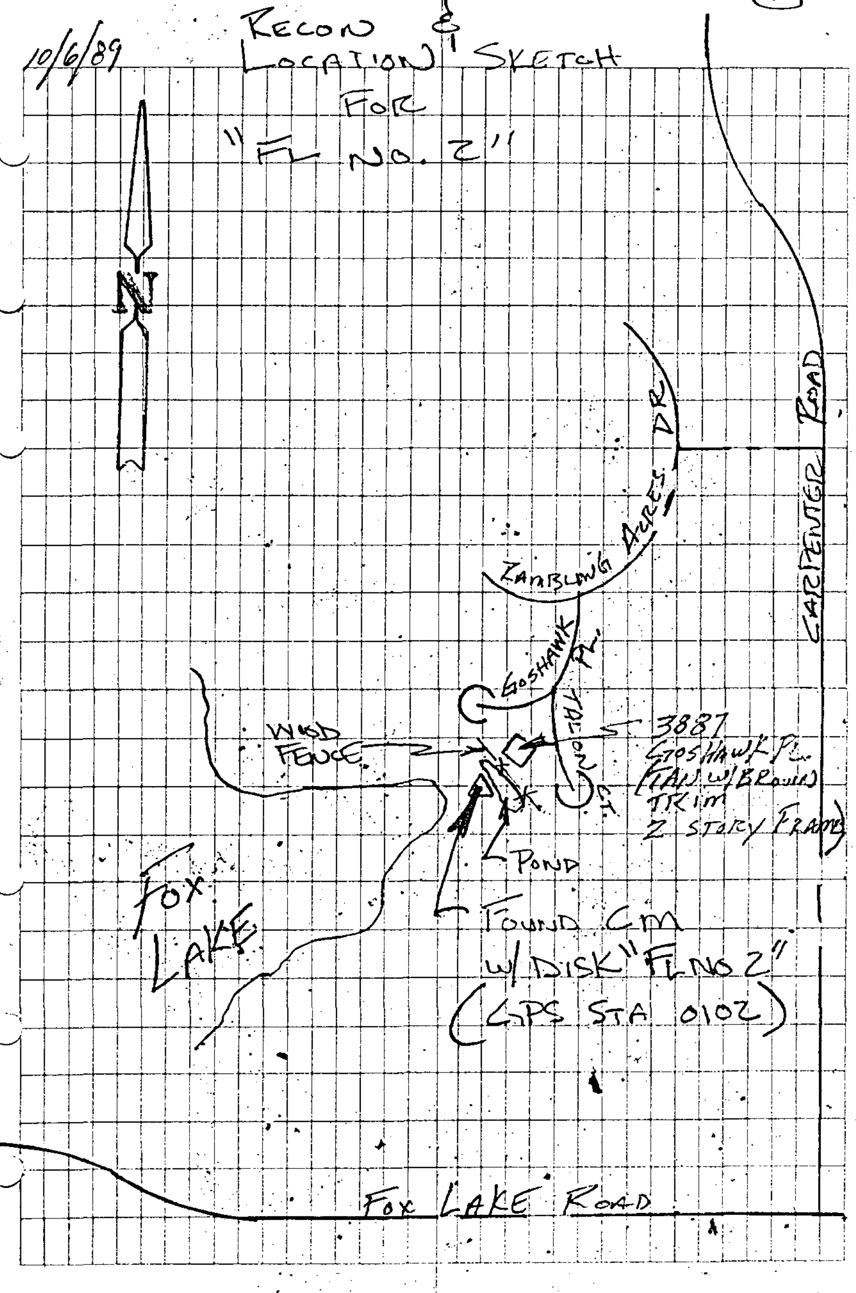
STA	+	HI	−	EL.	DESC.
CITY/TITUSVILLE BM				23.227 ~~22.50~~	NAIL @ E/P LOCATED @ SW QUAD. OF INT. TIWA LN. & CARPENTER RD
FOUND AS DESC.					
	6.092				
178'	5.204				
	4.316				
	m=5.204	28.431 ~~27.704~~			
			2.922		
		170'	7.078		
			6.227		
			m=7.076	21.355	
T.P.				~~20.628~~	
	8.516				
343'	6.802				
	5.088				
	m=6.802	28.157 ~~27.430~~			
			8.469		
		353'	6.706		
			4.942		
			m=6.706	21.452 ~~20.725~~	FOUND NAIL & DISK @ ℄ TIWA LN @ ℄ CUL DI SAC
	5.337				
144'	4.613				
	3.894	26.066			
	m=4.615	~~25.339~~			
			7.306		
		147'	6.568		
			5.835	19.497	FOUND G.M. W/DISK
			m=6.570	~~18.770~~	"SL No 2B"

10/6/89

RECON: GPS & HYDRO CONTROL

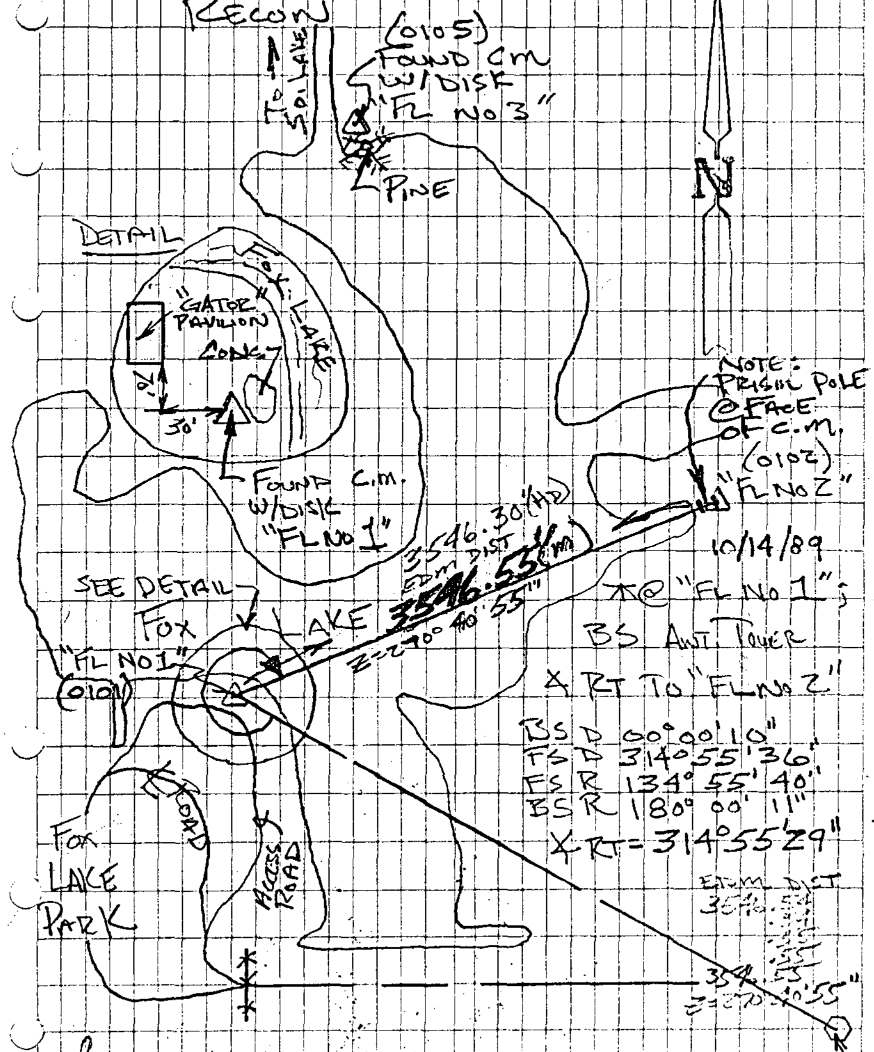


10/6/89 RECON & LOCATION SKETCH FOR "FL NO. 2"



10/6/89

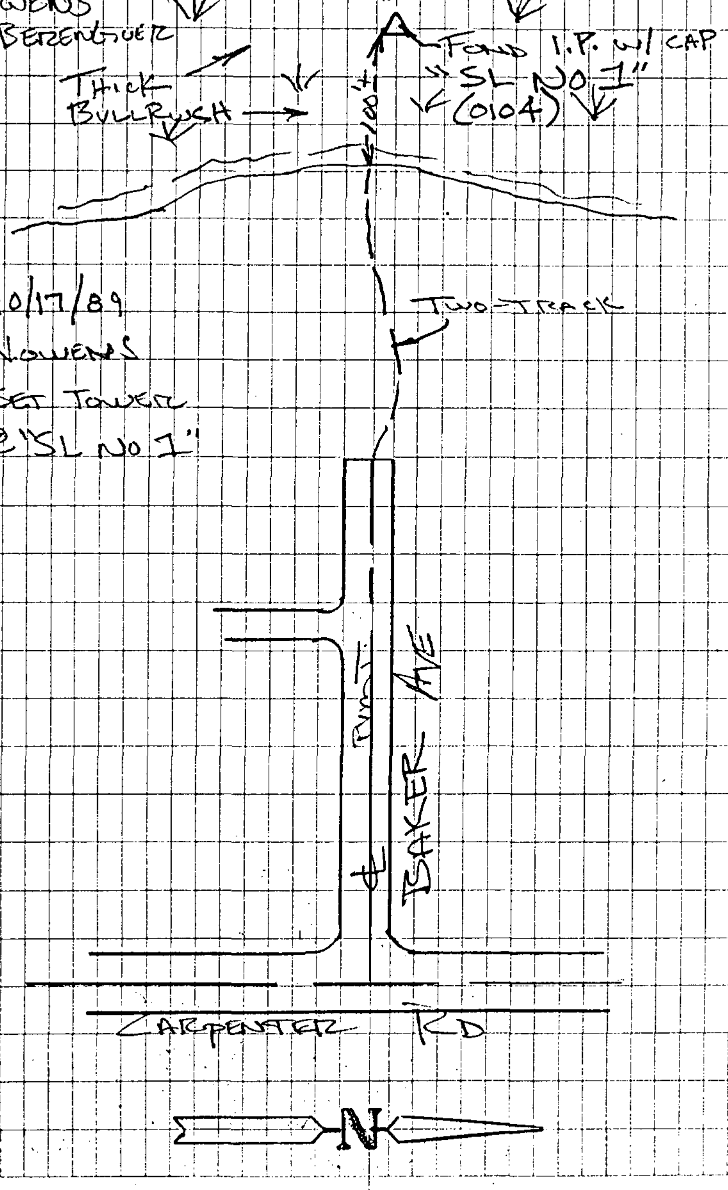
GPS - Hydro Control
Recon



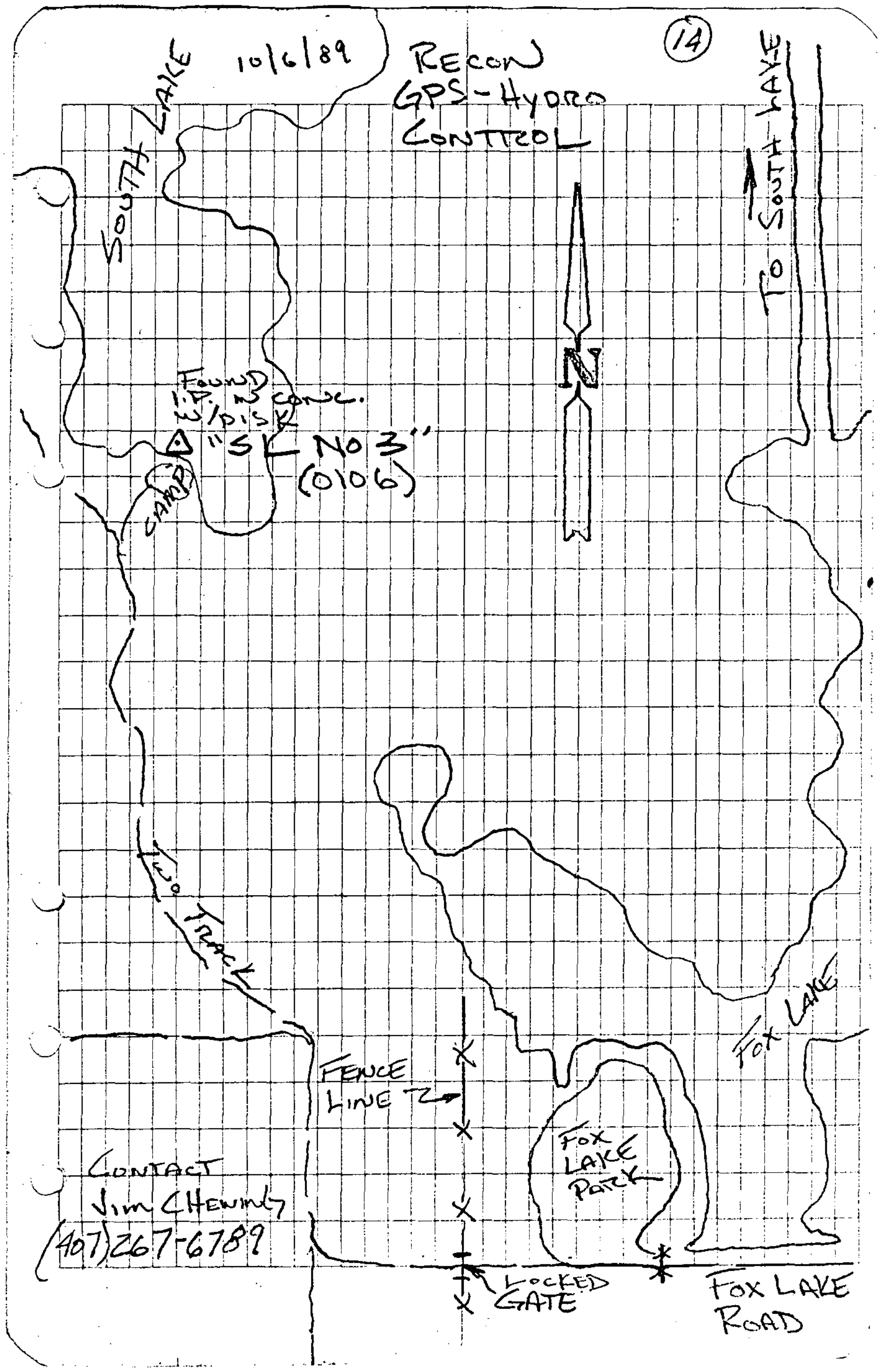
Note:
Meas. Dist. x Scale Factor
= St. Pl. Grid

10/6/89
RECON GPS - HYDRO CONTROL

V. OWENS
P. BERENGUER



10/17/89
V. OWENS
SET TOWER
@ "SL NO 1"


10/6/89
RECON
GPS-HYDRO
CONTROL
(14)
SOUTH LAKE
TO SOUTH LAKE
N
FOUND
I.P. IN CONC.
W/DISK
"SL NO 3"
(0106)
CAMP
TWO TRACK
FENCE
LINE
CONTACT
Jim CHEWING
(407)267-6789
FOX LAKE PARK
FOX LAKE
LOCKED GATE
FOX LAKE
ROAD

(14A)

10/9/89, CLEAR - CLOUDY - RAIN

J. OWENS GPS SURVEY
C. RANSOME @
P. BERENGUER So. & FOX LAKES

S. HALL
T. WALTER } STJRWMD w/ AIRBOATS

SESSION A: 1410 - 1610 (GMT)
OCCUPIED: 0101, 0102, 0103, 0013
SV'S: 2, 6, 9, 11, 12, 13, 14

SESSION B: 1710 - 1910 (GMT)
OCCUPIED: 0201, 0202, 0203, 0013
SV'S: 3, 9, 11, 12, 13, 14

V. OWENS ; P. BERENGUER — 10/14/89
SUNNY & HOT

3 WIRE BENCH RUN FROM
"I95 73 B11" TO
"FL No 1"

STA	+	HI	−	EL.	DESC.
"I9573 B11"	2.379 1.409 0.441 194 m=1.410	44.339		42.929	FD DISK IN F.L. ROAD OVERPASS AS DESC.
			12.838 11.936 11.033 181' m=11.936		
T.P. 1				32.403	B/C
	2.027 1.667 1.307 72 m=1.667	34.070			
			8.833 8.446 8.058 78' m=8.446		
T.P. 2				25.624	B/C
	2.573 2.003 1.431 114 m=2.002	27.626			
			7.523 6.966 6.408 112 m=6.966		
T.P. 3				20.660	E/P

15A

STA	+	HI	-	EL.	DESC.
T.P. 3				20.660	E/P
	329' 7.838 6.192 4.548 m=6.193	26.853			
			320' 6.588 4.988 3.393 m=4.990		
T.P. 4				21.863	E/P
	296' 6.951 5.469 3.988 m=5.469	27.332			
			292' 7.561 6.099 4.638 m=6.099		
T.P. 5				21.233	E/P
	384' 6.598 4.678 2.756 m=4.677	25.910			
			386' 6.421 4.495 2.563 m=4.493		
T.P. 6				21.417	E/P
	350' 8.169 6.421 4.670 m=6.420	27.837			
			365' 6.068 4.247 2.423 m=4.246		
T.P. 7				23.591	E/P

STA	+	HI	−	ELEV.	DESC.
T.P. 7				23.591	E/P
	347' 6.789 5.052 3.319 m=5.053	28.644			
			358' 6.549 4.761 2.969 m=4.760		
T.P. 8				23.884	E/P
	400' 8.215 6.219 4.220 m=6.218	30.102			
			391' 9.159 7.203 5.246 m=7.203		
T.P. 9				22.899	E/P
	362' 5.721 3.911 2.101 m=3.911	26.810			
			366' 8.494 6.661 4.835 m=6.663		
T.P. 10				20.147	EP
	329' 7.102 5.459 3.812 m=5.458	25.605			
			330' 7.469 5.820 4.174 m=5.821		
T.P. 11				19.784	E/P

(16A)

STA	+	HI	-	EL.	DESC
T.P. 11				19.784	
	6.489				
	4.381				
	2.275				
	m=4.382	24.166			
			5.771		
			3.482		
			1.198		
T.P. 12			m=3.484	20.682	TOP/POST
	3.509				
	2.703				
	1.899				
	m=2.704	23.386			
			7.374		
			6.810		
			6.241		TOP/DISK
"FL No. 1"			m=6.808	16.578	FOUND C.M. W/DISK "FL NO 1"
	8.910				
	7.436				
	5.950				
	m=7.432	24.010			
			7.169		
			5.196		
			3.221		
			m=5.195	18.815	SET NAIL IN N.E. MOST PILE @ N. END OF WOOD DOCK ADJ. TO BOAT RAMP IN F.L. PARK

NOTE: MEASURED DOWN 3.22 FEET TO WATER F.L. = 15.60

SUNNY & HOT

10/15/89
V. OWENS
P. BERENGUER

3-WIRE BENCH RUN FROM "I95 73 B13" TO TIWA LANE

STA.	+	HI	-	EL.	DESC.
"I9573B13"				36.617	FD cm w/BRASS DISC AS DESC.
	8.945 670 5.602 2.249 m=5.599	42.216			
			6.335 558 3.547 0.754 m=3.545		
TP 1				38.671	E/P I95
	5.273 341 3.566 1.859 m=3.566	42.237			
			13.063 338 11.371 9.685 m=11.373		
T.P. 2				30.864	E/P
	3.286 254 2.011 0.745 m=2.014	32.878			
			3.693 279 2.299 0.907 m=2.300		
T.P. 3				30.578	TOP/ FENCEPOST

(17A)

STA	+	HI	−	EL	DESC.
T.P. 3				30.578	
	10.388 8.148 5.903 m=8.146	38.724			
			2.959 1.529 0.098 m=1.529		
T.P.4				37.195	E/P
	9.571 7.421 5.272 m=7.421	44.616			
			9.998 6.302 2.609 m=6.303		
T.P.5				38.313	E/P
	6.736 5.203 3.666 m=5.202	43.515			
			12.888 11.502 10.119 m=11.503		
T.P. 6				32.012	NAIL IN P.POLE @ CARPENTER RD. & GARDEN ST.
	2.069 1.209 0.347 m=1.208	33.220			
			10.823 9.956 9.088 m=9.956		
T.P. 7				23.264	E/P

STA	+	HI	−	EL.	DESC.
T.P. 7				23.264	E/P
	M 8.593 3 7.273 N 5.959 m=7.275	30.539			
			- 9.219 301 7.313 M 5.405 m= 7.312		
CITY/TITUSVILLE BM				23.227	FD NAIL @E/P LOCATED @ SW QUAD ON INT. TIWA LN & CARPENTER

NOTE: SEE PG. 9 & 9A THIS BOOK;
I FIND A DISCREPECY WITH THE
ELEVATION FROM CITY OF
TITUSVILLE (EL=22.50)
∴ ELEVATION ON "SLINOZR"
WILL BE EL= 19.497.
I MEASURED ELEVATION
OF LAKE WATER IN SOUTH
LAKE EL= 15.53

[signature]

(18A)

10/15/89

SET H_2O LEVEL RECORDER @ SOUTH LAKE ON WOOD DOCK BEHIND JORDAN RES.

J. OWENS
R. LARSEN
P. BERENGUER

STA	+	HI	−	EL	DESC.
TBM	5.40			19.50	"SL No 2B"
		24.90	9.37	15.53	So. LK. EL.
			7.90	17.00	TOP/STAFF
	7.95				
TBM		24.95	5.45	19.50	"SL No 2B"

SET H_2O LEVEL RECORDER @ FOX LAKE PARK BOAT RAMP

10/15/89
J. OWENS
R. LARSEN
P. BERENGUER

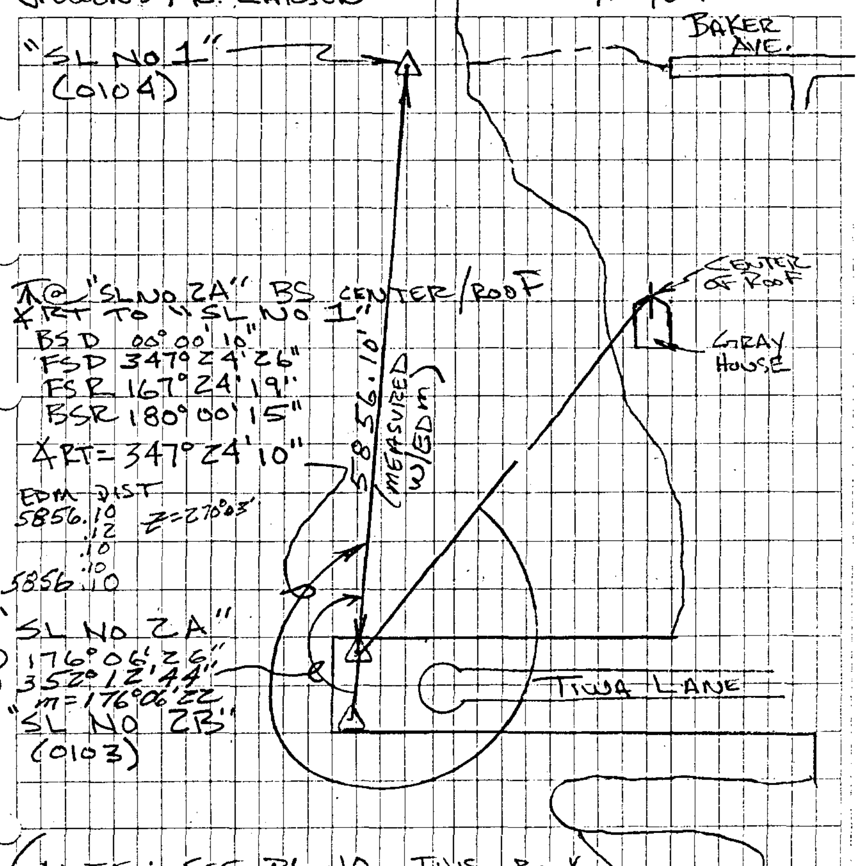
STA	+	HI	−	EL	DESC.
TBM	4.14			18.82	NAIL IN TOP/PILE @ N. END OF DOCK
		22.96	7.37		
				15.59	FOX LAKE ELEV.
			5.96	17.00	TOP/STAFF
	6.09				
		23.09			
TBM			4.27	18.82	NAIL IN PILE

SET HYDRO CONTROL

CLEAR, COOL

J. OWENS, R. LARSEN

10/17/89



∡ @ "SL NO 2A" BS CENTER/ROOF
∡RT TO "SL NO 1"
BSD 00°00'10"
FSD 347°24'26"
FSR 167°24'19"
BSR 180°00'15"
∡RT = 347°24'10"

EDM DIST
5856.10 Z=270°03'
.12
.10
.10
5856.10

"SL NO 2A"
(1) 176°06'26"
(2) 352°12'44"
m=176°06'22"
"SL NO 2B"
(0103)

(NOTE: SEE PG 10 THIS BOOK)

(19A)

⊼@ "FL No 1" ; B.S. T.V. ANT. TOWER
∡RT FS "FL No 1B" (SET I.R. @ E/W)

BSD 00° 00' 34"
FSD 335° 39' 29"
FSR 155° 39' 31"
BSR 180° 00' 31"
∡RT = 335° 38' 58"

F.S. DIST W/EDM
720.68
.67
.68
720.67
Z = 269° 50' 01"

⊼@ "FL No 1B" (S.I.R.) ; BS "FL No 1"
∡RT FS LASER TRACK POSITION #5

BSD 00° 00' 10"
FSD 117° 49' 40"
FSR 297° 49' 44"
BSR 180° 00' 19"
∡RT. = 117° 49' 28"

FS DIST. W/EDM
1933.20'
.21
.20
1933.20
Z = 270° 06' 50"

⊼@ "FL No 3" ; BS T.V. ANT. TOWER
∡RT FS LASER TRACK POSITION # 4

BSD 00° 00' 06"
FSD 93° 12' 11"
FSR 273° 12' 15"
BSR 180° 00' 12"
∡RT = 93° 12' 04"

FS DIST. W/EDM
176.99'
.98
.98
176.99'
Z = 270° 00' 10"

⊼@ "FL No 1" ; BS TV ANT. TOWER
∡RT FS "FL No 1A"

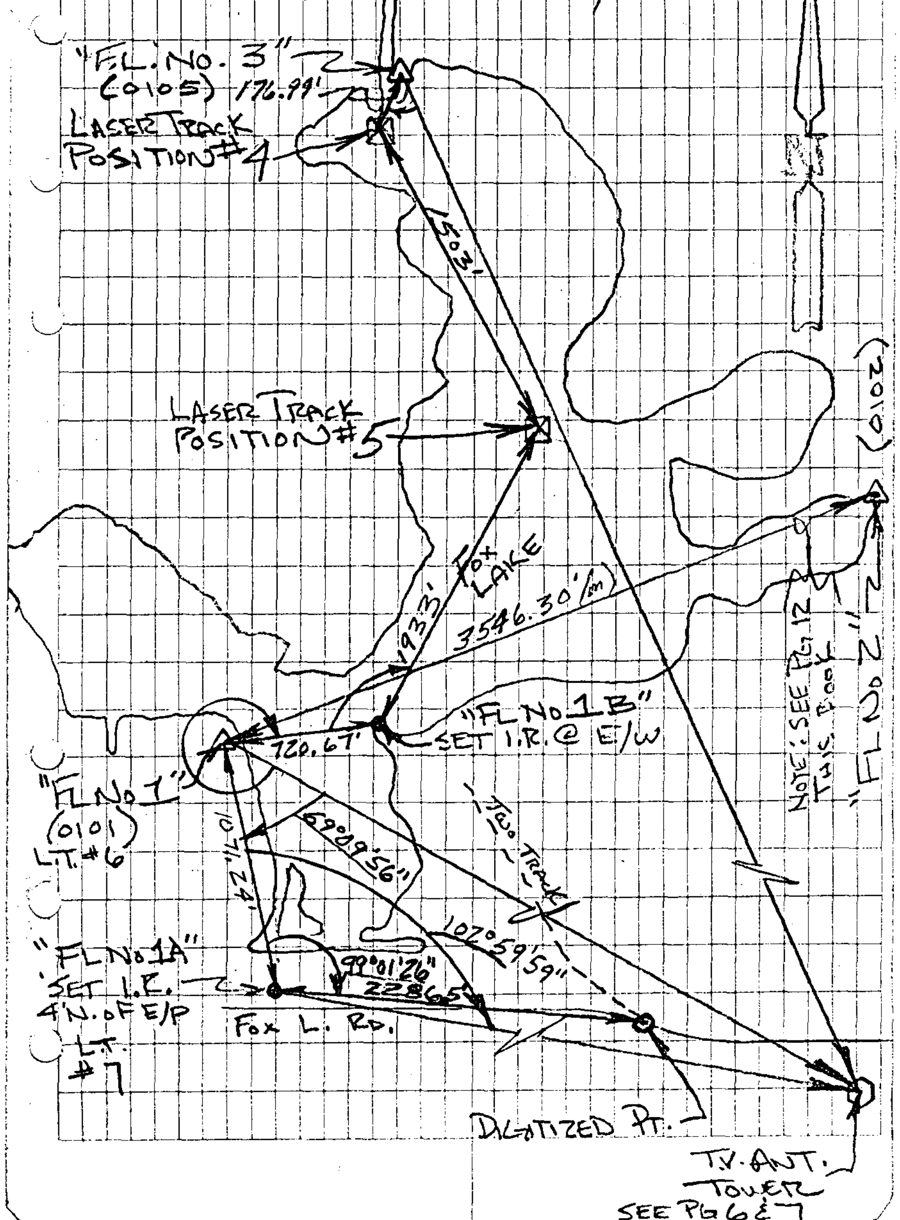
1) 69° 09' 54"
2) 138° 19' 52"
m = 69° 09' 56"

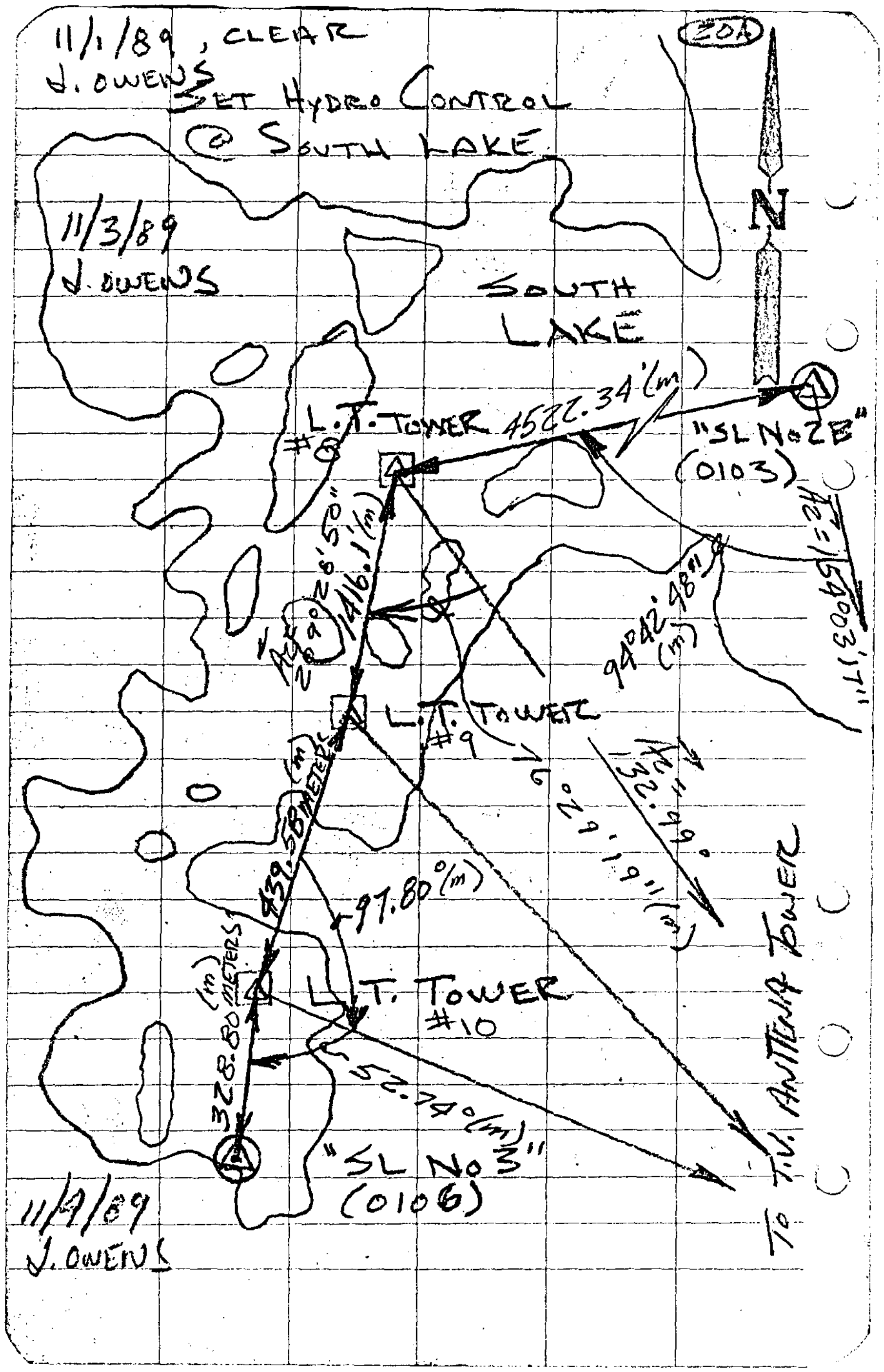
FS DIST W/EDM
1071.24'
.23
.24
1071.24
Z = 90° 01'

J. OWENS R. FLANCE
J. FALLEN

CLEAR 10/19/89 (20)

SET CONTROL @ FOX LAKE - FOR HYDRO - SURVEY

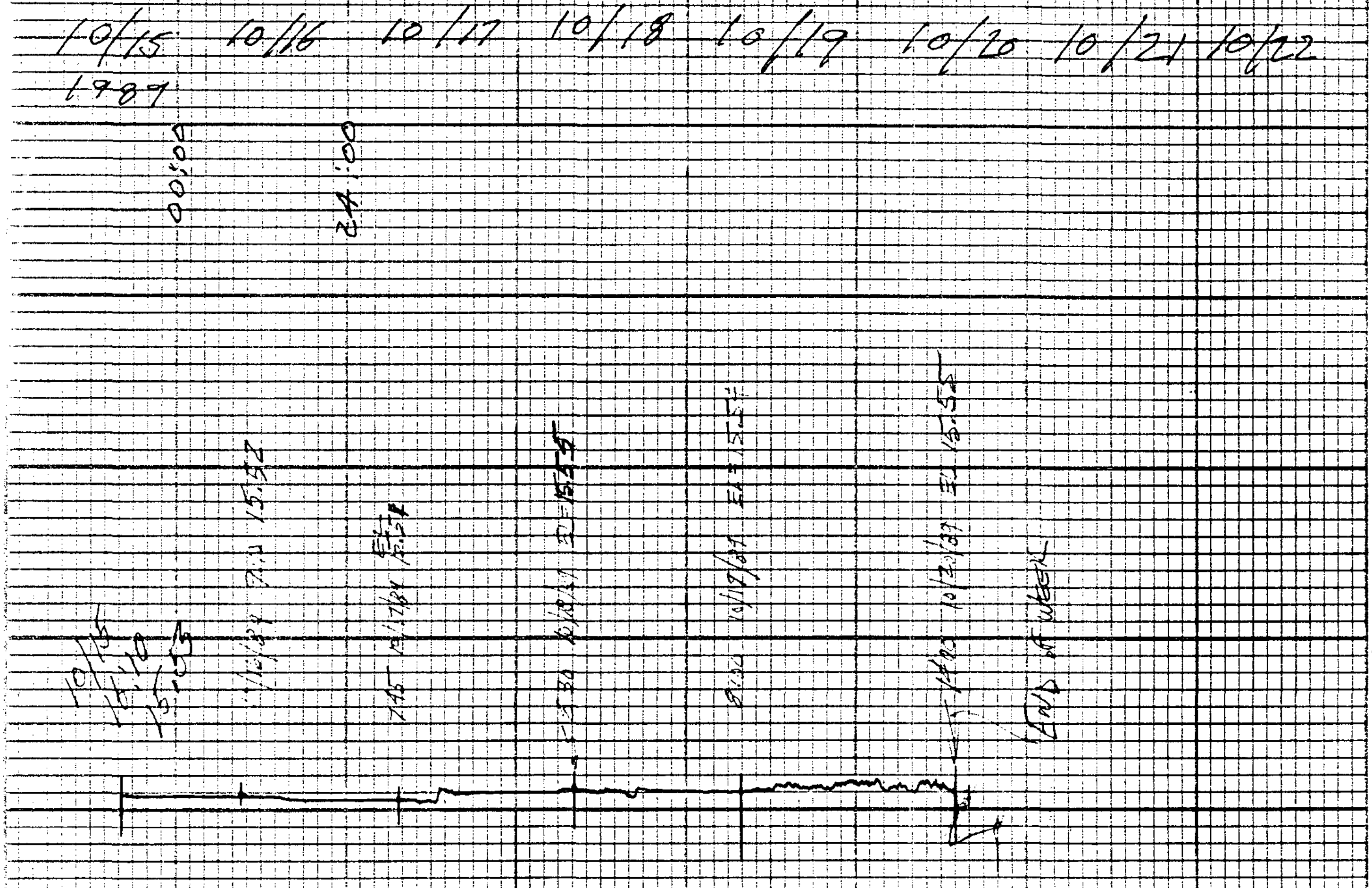


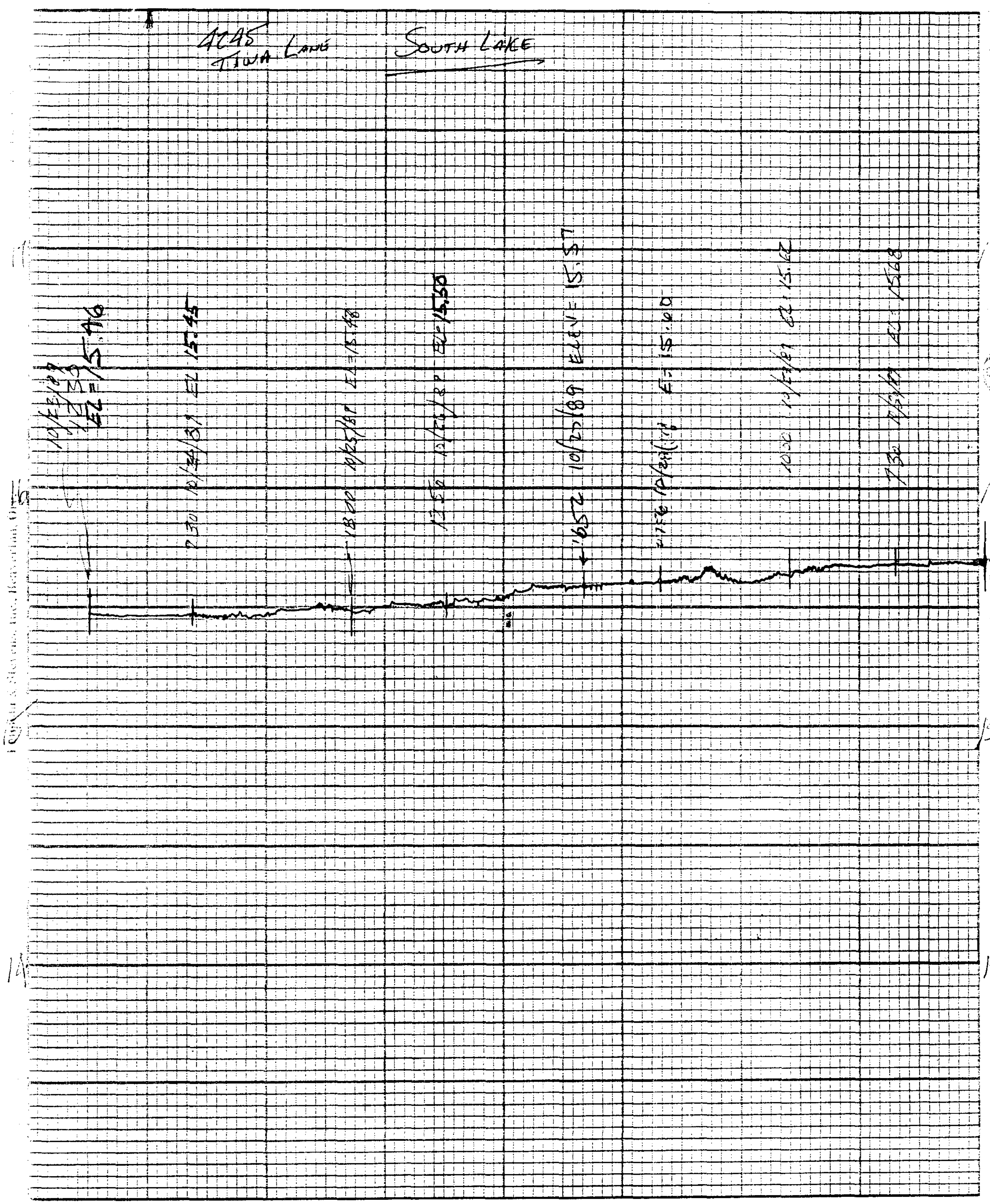

11/1/89, CLEAR
J. OWENS SET HYDRO CONTROL
@ SOUTH LAKE
11/3/89
J. OWENS
SOUTH LAKE
N
L.T. TOWER #8
4522.34'(m)
"SL No 2E"
(0103)
20°28'50"
1416.1(m)
94°42'48"(m)
L.T. TOWER #9
439.5 METERS (m)
97.80°(m)
L.T. TOWER #10
328.80 METERS (m)
52.74°(m)
"SL No 3"
(0106)
11/4/89
J. OWENS
To T.V. ANTENNA TOWER

APPENDIX "E"

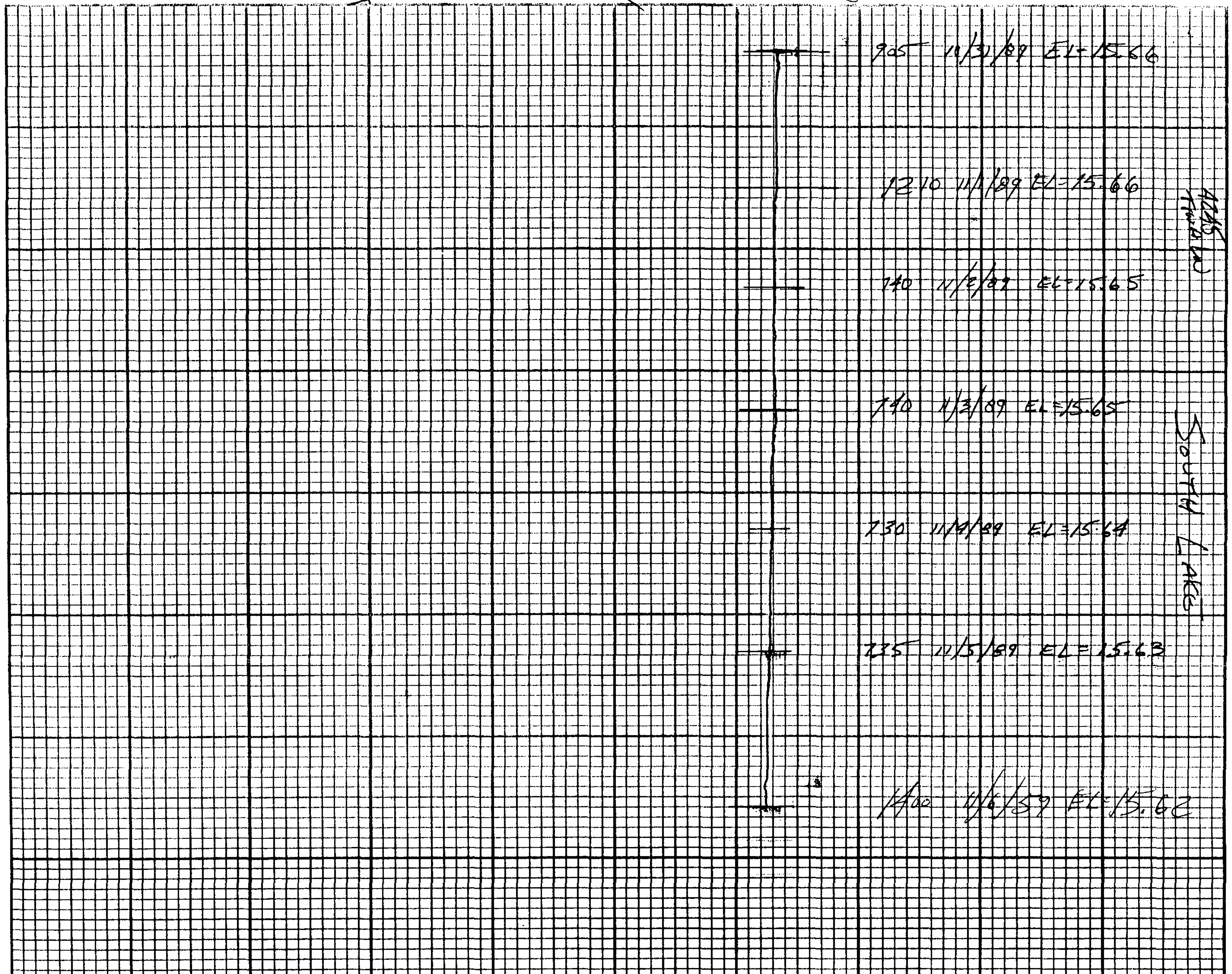
Copies of Water Level Records

STEVENS RECORDER TYPE F MODEL 68 SERIAL No. 88369-78
SET BY J. OWENS & R. LARSEN 10/15/89 1600
@ SOUTH LAKE ; 4245 TIWA LANE
TITUSVILLE, FL.




4245 Tiwa Lane
South Lake
16
14

Leupold & Stevens Inc. Beaverton, Ore.



Stevens Water Level Recorder — Type F

Chart F-1

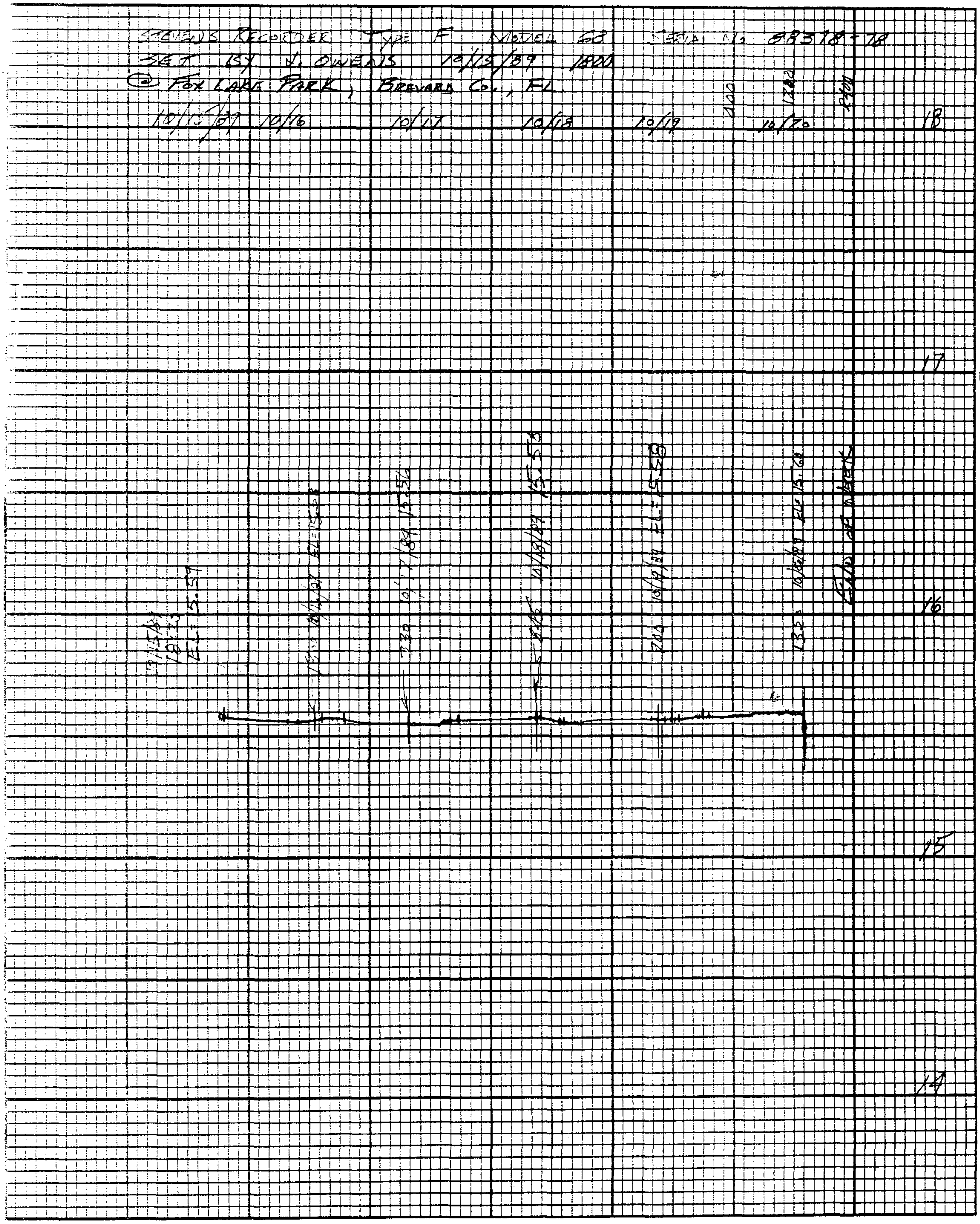


Chart F-1

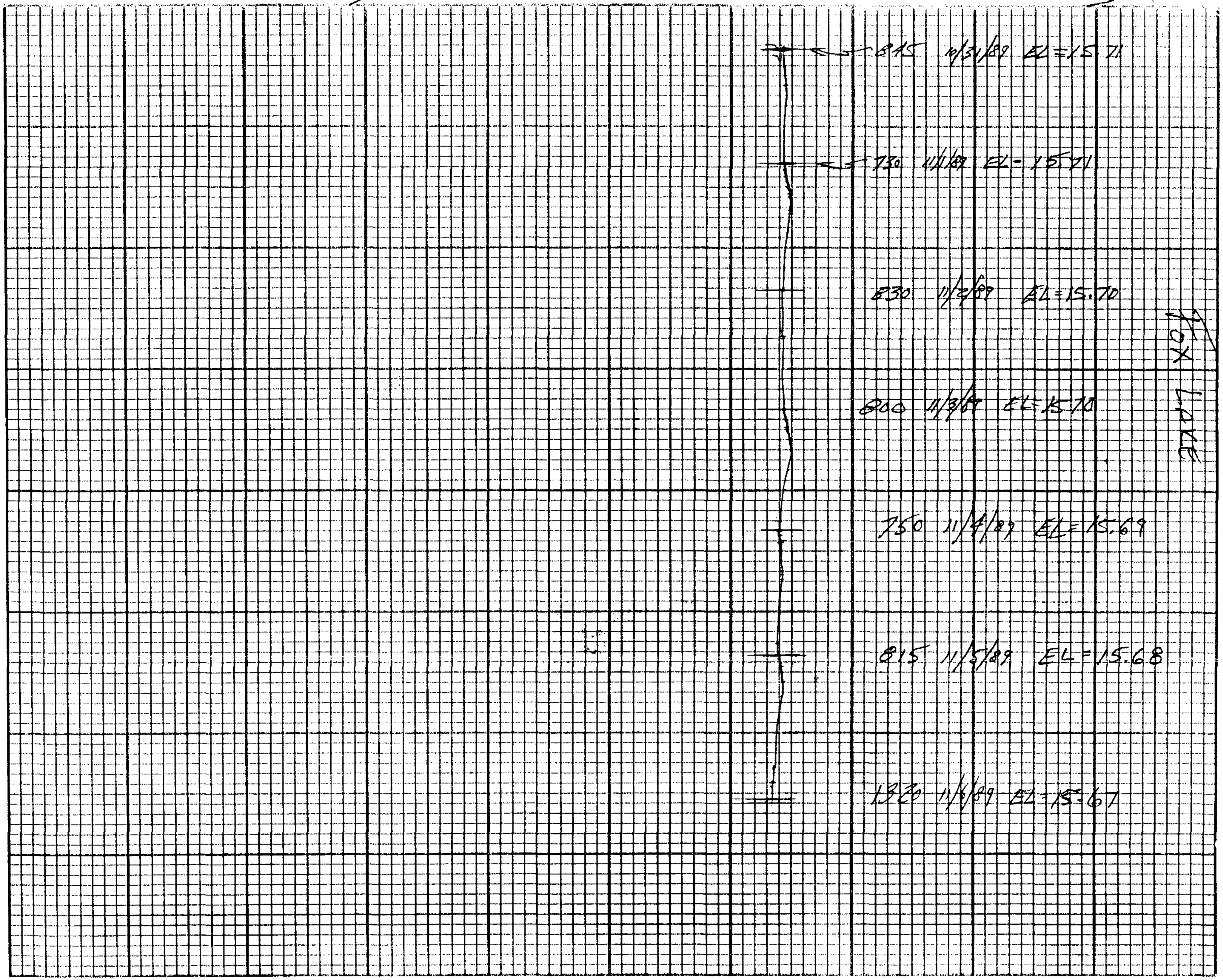
Stevens Water Level Recorder — Type F

Leupold & Stevens ..., Beaverton, Ore.

Leupold & Stevens, Inc., Beaverton, Ore. Printed in U.S.A.

Stevens Water Level Recorder — Type F Chart F-1

Leupold & Stevens, Inc. Beaverton, Ore.



Stevens Water Level Recorder — Type F

Chart F-1

APPENDIX "F"

Start and End of Line Coordinates

Planned Lines and Actual Lines Run

INITIAL (PROPOSED) START AND END OF LINE COORDINATES

HYDROGRAPHIC SURVEY - SOUTH AND FOX LAKES 10/15/89

File Name: SJR1_POST
AUTOPLOT SCALE# 6 CENTER N 1554693 E 541047

		SOL		EOL		LINE	
#	NAME	NORTH	EAST	NORTH	EAST	AZIMUTH	RANGE
1	X_000	1563740	540546	1563725	541334	91.1	788.1
2	X_0500	1563224	540155	1563237	542127	89.6	1972.0
3	X_1000	1562729	540033	1562747	542654	89.6	2621.1
4	X_1500	1562228	539859	1562263	542932	89.3	3073.2
5	X_2000	1561727	539267	1561732	543091	89.9	3824.0
6	X_2500	1561248	538975	1561238	543202	90.1	4227.0
7	X_3000	1560766	539170	1560654	543509	91.5	4340.4
8	X_3500	1560245	539464	1560236	543598	90.1	4134.0
9	X_4500	1559223	539935	1559225	543378	90.0	3443.0
10	X_5000	1558748	540115	1558739	543347	90.2	3232.0
11	X_5500	1558253	540036	1558259	543755	89.9	3719.0
12	X_6000	1557682	540080	1557782	544019	88.5	3940.3
13	X_6500	1557198	540208	1557240	544002	89.4	3794.2
14	X_7000	1556700	540321	1556749	544018	89.2	3697.3
15	X_7500	1556257	540248	1556265	544176	89.9	3928.0
16	X_8000	1555721	544092	1555703	540464	269.7	3628.0
17	X_8500	1555149	540588	1555280	544547	88.1	3961.2
18	X_9000	1554710	544029	1554725	540714	270.3	3315.0
19	X_9500	1554257	540358	1554234	543855	90.4	3497.1
20	X_10000	1553736	543590	1553762	540335	270.5	3255.1
21	X_10500	1553217	543305	1553246	540868	270.7	2437.2
22	X_11000	1552679	541009	1552734	543125	88.5	2116.7
23	X_11500	1552214	541739	1552300	543140	86.5	1403.6
24	X_8720	1554957	540394	1555035	539361	274.3	1035.9
25	X_9160	1554566	540364	1554474	539362	264.8	1006.2
26	X_9720	1554022	540313	1553948	539278	265.9	1037.6
27	X_10230	1553797	538743	1553313	540302	107.2	1632.4
28	X_10890	1552845	538449	1552820	538160	265.1	290.1
29	X_11300	1552424	539211	1552412	538094	269.4	1117.1
30	X_11780	1552002	538144	1551904	538469	106.8	339.5
31	X_12250	1551217	538292	1551230	537547	271.0	745.1
32	X_12900	1550827	538790	1550835	537735	270.4	1055.0
33	X_13350	1550342	538789	1550344	537964	270.1	825.0
34	X_13670	1550062	542296	1550060	541346	269.9	950.0
35	X_14160	1549548	542771	1549566	541739	271.0	1032.2
36	X_14760	1548947	542675	1548978	541966	272.5	709.7
37	X_15350	1548371	541805	1548350	543716	90.6	1911.1
38	X_15660	1548079	543118	1548058	541751	269.1	1367.2
39	X_16150	1547556	543565	1547581	541783	270.8	1782.2
40	X_16151	1547584	540628	1547579	539681	269.7	947.0
41	X_16650	1547076	539911	1547076	542896	90.0	2985.0
42	X_17150	1546572	541749	1546580	541026	270.6	723.0
43	X_17650	1546095	541891	1546076	541274	268.2	617.3
44	X_18000	1545657	541956	1545646	541055	269.3	901.1
45	X_4000	1559755	539936	1559744	543775	90.2	3839.0

INITIAL (PROPOSED) START AND END OF LINE COORDINATES

HYDROGRAPHIC SURVEY - SOUTH AND FOX LAKES 10/15/89 (CONTINUED)

File Name: SJR2_POST
AUTOPLOT SCALE# 5 CENTER N 1550392 E 541341

#	NAME	SOL NORTH	SOL EAST	EOL NORTH	EOL EAST	LINE AZIMUTH	LINE RANGE
1	X_S1	1547562	543163	1548205	544168	57.4	1193.1
2	X_S2	1547571	539830	1548246	539387	326.7	807.4
3	X_H1	1554692	539631	1555111	539539	347.6	429.0
4	X_H3	1552682	538878	1551922	538869	180.7	760.1
5	X_H5	1549695	538515	1550593	538513	359.9	898.0
6	X_H6	1552728	541581	1549695	541603	179.6	3033.1
7	X_H8	1547887	540081	1547269	540070	181.0	618.1
8	X_H9	1546576	541139	1545672	541129	180.6	904.1

FINAL COORDINATES; HYDROGRAPHIC SURVEY, SOUTH LAKE, 10/22/89.

File Name: SJR1SLAKE

AUTOPLOT SCALE# 6 CENTER N 1556692 E 540545

		SOL		EOL		LINE	
#	NAME	NORTH	EAST	NORTH	EAST	AZIMUTH	RANGE
1	X_000	1563727	541895	1563727	540475	270.0	1420.0
2	X_0500	1563227	542575	1563227	540135	270.0	2440.0
3	X_1000	1562727	543095	1562727	540035	270.0	3060.0
4	X_1500	1562227	543335	1562227	539815	270.0	3520.0
5	X_2000	1561727	543515	1561727	539105	270.0	4410.0
6	X_2500	1561227	543395	1561227	538815	270.0	4580.0
7	X_3000	1560727	543845	1560727	538705	270.0	5140.0
8	X_3500	1560227	543945	1560227	538835	270.0	5110.0
9	X_4000	1559727	543785	1559727	539895	270.0	3890.0
10	X_4500	1559227	543535	1559227	539935	270.0	3600.0
11	X_5000	1558727	543465	1558727	540115	270.0	3350.0
12	X_5500	1558227	543845	1558227	540025	270.0	3820.0
13	X_6000	1557727	544045	1557727	539905	270.0	4140.0
14	X_6500	1557227	544075	1557227	540095	270.0	3980.0
15	X_7000	1556727	544185	1556727	540165	270.0	4020.0
16	X_7500	1556227	544175	1556227	540345	270.0	3830.0
17	X_8000	1555727	544075	1555727	540525	270.0	3550.0
18	X_8500	1555227	544515	1555227	540645	270.0	3870.0
19	X_9000	1554727	544115	1554727	540355	270.0	3760.0
20	X_9500	1554227	543865	1554227	540355	270.0	3510.0
21	X_10000	1553727	543635	1553727	540355	270.0	3280.0
22	X_10500	1553227	543625	1553227	540835	270.0	2790.0
23	X_11000	1552727	543335	1552727	540975	270.0	2360.0
24	X_11500	1552227	543125	1552227	541905	270.0	1220.0
25	X_8720	1555007	540455	1555007	537195	270.0	3260.0
26	X_9160	1554567	540355	1554567	537055	270.0	3300.0
27	X_9720	1554007	540355	1554007	538095	270.0	2260.0
28	X_10230	1553497	540355	1553497	538055	270.0	2300.0
29	X_10890	1552837	539445	1552837	538075	270.0	1370.0
30	X_11300	1552427	539235	1552427	538155	270.0	1080.0
31	X_11780	1551947	538515	1551947	537635	270.0	880.0
32	X_11781	1551947	537295	1551947	536575	270.0	720.0
33	X_12250	1551477	538055	1551477	537155	270.0	900.0
34	X_12900	1550827	538835	1550827	537775	270.0	1060.0
35	X_13350	1550337	538855	1550337	537995	270.0	860.0
36	X_H1	1555407	539615	1554807	539615	180.0	600.0
37	X_H2	1555547	537485	1554807	537485	180.0	740.0
38	X_H3	1552527	538865	1551827	538865	180.0	700.0
39	X_H4	1550787	537615	1549987	537615	180.0	800.0
40	X_H5	1550337	538515	1549657	538515	180.0	680.0
41	X_H6	1552727	541595	1549727	541585	180.2	3000.0

FINAL COORDINATES; HYDROGRAPHIC SURVEY, FOX LAKE, 10/22/89.

File Name: SJR2FLAKE
AUTOPLOT SCALE# 3 CENTER N 1547892 E 541845

#	NAME	SOL NORTH	SOL EAST	EOL NORTH	EOL EAST	LINE AZIMUTH	LINE RANGE
1	X_13670	1550057	542515	1550057	541285	270.0	1230.0
2	X_14160	1549567	542835	1549567	541755	270.0	1080.0
3	X_14760	1548967	542735	1548967	541955	270.0	780.0
4	X_15350	1548377	543885	1548377	541715	270.0	2170.0
5	X_15660	1548067	543175	1548067	541795	270.0	1380.0
6	X_16150	1547577	543635	1547577	541775	270.0	1860.0
7	X_16151	1547577	540735	1547577	539735	270.0	1000.0
8	X_16650	1547077	542955	1547077	540005	270.0	2950.0
9	X_17150	1546577	541775	1546577	541035	270.0	740.0
10	X_17650	1546077	541915	1546077	541255	270.0	660.0
11	X_18000	1545727	541955	1545727	541055	270.0	900.0
12	X_H7	1548457	539495	1547977	539495	180.0	480.0
13	X_S1	1548047	544195	1547577	543185	245.0	1114.0
14	X_S2	1547577	539835	1547977	539495	319.6	525.0
15	X_H8	1548077	540075	1547277	540075	180.0	800.0
16	X_H9	1546577	541135	1545727	541155	178.7	850.2

APPENDIX "G"

Summary Daily Logs

SUMMARY DAILY LOG

Date	Activity
Task #1	One Man Crew (nominally)
9/22	Researching property owners, obtaining documentation on existing benchmarks from City and County departments.
10/02	Choosing locations for GPS monuments at Sawgrass and Hell'n Blazes Lakes, checking out aluminum tower from SJR Melbourne Station.
10/03	Choosing locations for GPS monuments at South and Fox Lakes. Permitting sites.
10/05	(Two man crew) Recovered DOT control and benchmarks from City and County. Setting eccentric points for Lasertrak locations where different from GPS sites.
10/06	(Two man crew) Checking GPS sites for satellite visibility. Ran elevations from City and County benchmarks to water level recorder locations.
10/14	(Two man crew) Half day to run new vertical control in from DOT benchmarks to Fox Lake water level recorder.
10/15	(Two man crew) Half day to run new vertical control in from DOT benchmarks to South Lake water level recorder.

Total time 11 man days plus equipment.

Task #2	Four Man Field Crew plus 4 GPS Receivers
10/08	Mobilization of GPS equipment and personnel to Titusville.
10/09	GPS observations at South/Fox Lakes with assistance from SJR personnel and airboats.
10/10	GPS observations at Sawgrass Lakes with assistance from SJR personnel and airboats. Demobilization of equipment.
10/11	Processing GPS data.
10/12	Processing GPS data.

Total time 3 crew days plus 2 man days processing. Total number of GPS points set was 12.

Date	Activity
Task #3	Hydrographic and Sediment Depth Survey (4 to 6 man crew plus equipment)
10/14	Mobilization of airboat in Orlando
10/15	Mobilization of Airboat in Orlando. Second crew checking GPS baselines, running benchmarks again (see above), and mobilizing positioning equipment.
10/16	Mobilization of Hydro equipment on airboat, testing fathometer and GPR on South and Fox Lakes. Second crew building foundations for lasertrak locations in marsh.
10/17	Testing fathometer and GPR on Sawgrass Lakes. Demobbing GPR. Second crew building tower foundations for lasertrak. Busting lines in tall reeds (Stns 60+00 to 80+00)
10/18	Finishing tower foundations in South Lake. Measured GPS baseline between two observation data sets. Busting lines in tall reeds (Stns 80+00 to 10+00)
10/19	Installing tower foundations in Fox Lake and determining coordinates, finish testing depth capability of fathometer. Demob fathometer. Testing method for manual data acquisition.
10/20	Attempting test manual data lines in Fox Lake, and setting control point in western extension of South Lake. Weather conditions forced early cancellation of work plans.
10/21} 10/22}	No work attempted due to weather.
10/23	Started manual data acquisition in South Lake (Stns 90+00, 95+00, & 100+00)
10/24	Manual data acquisition in South Lake (80+00, 85+00, 100+00, 105+00, 110+00, 115+00)(Re-run 90+00, 95+00 for repeatability)
10/25	Manual data acquisition in South Lake (70+00, 75+00, 65+00, 60+00)
10/26	Manual data acquisition in South Lake (70+00, 75+00) Further work abandoned due to weather.
10/27	No work carried out due to weather.
10/28} 10/29}	Construction of Tower foundations in western extension of South Lake
10/30	Manual data acquisition in South Lake (55+00, 50+00, 45+00, 40+00, 35+00, 30+00)(SJR boat and crew breaking line)
10/31	Manual data acquisition in South Lake (25+00, 20+00, 15+00, 10+00, 05+00)(SJR boat and crew breaking line)
11/01	Manual data acquisition in South Lake (00+00), manual data acquisition in Fox Lake (H6, 136+70, 141+60, 147+60, 166+50B, 153+50, 156+60, and 161+50)(SJRWMD boat and crew installing

platform in South Lake)

11/02 Manual data acquisition in Fox Lake (S1, 171+50, 176+50, H9, H8, 161+51, S2, 180+00)

11/03 Manual data acquisition in Western Extension of South Lake (87+20, 91+60, H1, 97+20, 102+30, 113+00, 108+90, 117+80, and H3)

11/04 Manual Data acquisition in Western Extension of South Lake (H5, 133+50, 129+00, 122+50) Demobilization of equipment from airboat. Survey crew returning to office.

11/06 Demobilizing equipment in office in Pinellas Park, travel back to site to pick up water level recorders. End of Fieldwork.

Total of 18 crew days (one crew), plus 1 day testing in Sawgrass, plus second crew for several days.

APPENDIX "H"

List of Equipment Used

Equipment Brochures

LIST OF EQUIPMENT USED

M.D.L. "Lasertrak" Laser range:azimuth positioning system

M.D.L. "Microtel" Radio-Telemetry System

Innerspace 440 dual frequency digital fathometer

SIR Ground Penetrating Radar System

Hewlett Packard 9816S computer

Hewlett Packard "Thinkjet" printer

Hewlett Packard 9121 dual floppy disk drive

Stevens Model 68 type F water level recorders.

Trimble models 4000SL and 4000ST GPS receivers

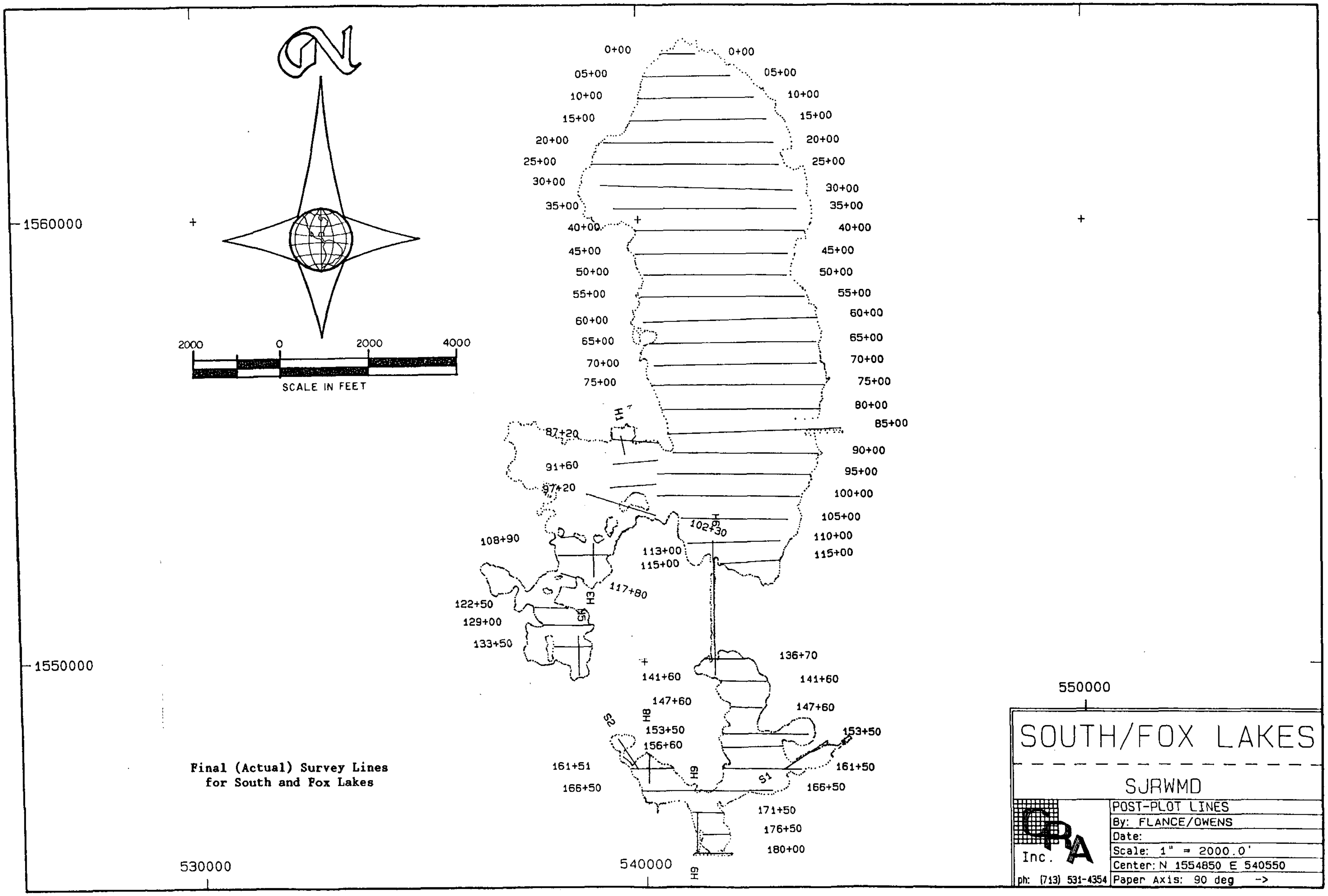
Topcon GTS-2 total station

Wild NA-2 Level

APPENDIX "I"

Tabulation of Hydrographic Data

Plan View Charts



Final (Actual) Survey Lines for South and Fox Lakes

SOUTH LAKE

LINE 00_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1563740.0	540546.0	1.8	15.66	13.9	3.5	12.2	71	0	-71.0	13.0
1563733.0	540611.0	1.5	15.66	14.2			136	100	-36.0	6.0
1563732.0	540679.0	1.9	15.66	13.8			204	200	-4.0	5.0
1563732.0	540779.0	1.5	15.66	14.2			304	300	-4.0	5.0
1563727.0	540878.0	0.8	15.66	14.9			403	400	-3.0	0.0
1563724.0	541012.0	1.1	15.66	14.6	13.0	2.7	537	500	-37.0	-3.0
1563730.0	541080.0	1.7	15.66	14.0			605	600	-5.0	3.0
1563713.0	541175.0	1.8	15.66	13.9			700	700	0.0	-14.0
1563724.0	541279.0	0.9	15.66	14.8			804	800	-4.0	-3.0
1563725.0	541334.0	0.9	15.66	14.8			859	900	41.0	-2.0
								AVG	-12.3	1.0
								STD	28.2	6.9

LINE 05_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Bottom	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1563224.0	540155.0	1.8	15.66	13.9	5.9	9.8	20	0	-20.0	-3.0
1563231.0	540237.0	4.2	15.66	11.5			102	100	-2.0	4.0
1563230.0	540334.0	3.8	15.66	11.9			199	200	1.0	3.0
1563231.0	540433.0	4.0	15.66	11.7			298	300	2.0	4.0
1563229.0	540545.0	4.0	15.66	11.7			410	400	-10.0	2.0
1563234.0	540651.0	4.0	15.66	11.7	13.0	2.7	516	500	-16.0	7.0
1563233.0	540730.0	4.2	15.66	11.5			595	600	5.0	6.0
1563226.0	540843.0	4.0	15.66	11.7			708	700	-8.0	-1.0
1563230.0	540935.0	4.3	15.66	11.4			800	800	0.0	3.0
1563224.0	541042.0	4.2	15.66	11.5			907	900	-7.0	-3.0
1563238.0	541140.0	4.1	15.66	11.6	13.5	2.2	1005	1000	-5.0	11.0
1563231.0	541231.0	3.8	15.66	11.9			1096	1100	4.0	4.0
1563231.0	541336.0	4.0	15.66	11.7			1201	1200	-1.0	4.0
1563225.0	541437.0	4.0	15.66	11.7			1302	1300	-2.0	-2.0
1563219.0	541521.0	4.2	15.66	11.5			1386	1400	14.0	-8.0
1563220.0	541627.0	3.8	15.66	11.9	13.5	2.2	1492	1500	8.0	-7.0
1563221.0	541755.0	3.2	15.66	12.5			1620	1600	-20.0	-6.0
1563218.0	541831.0	2.0	15.66	13.7			1696	1700	4.0	-9.0
1563231.0	541942.0	2.1	15.66	13.6			1807	1800	-7.0	4.0
1563232.0	542021.0	2.2	15.66	13.5			1886	1900	14.0	5.0
1563237.0	542127.0	1.9	15.66	13.8			1992	2000	8.0	10.0
								AVG	-1.8	1.3
								STD	9.4	5.6

LINE 10_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1562729.0	540033.0	1.8	15.66	13.9	4.0	11.7	-2	0	2.0	2.0
1562732.0	540131.0	4.6	15.66	11.1			96	100	4.0	5.0
1562731.0	540232.0	4.8	15.66	10.9			197	200	3.0	4.0
1562732.0	540335.0	4.6	15.66	11.1			300	300	0.0	5.0
1562734.0	540428.0	4.7	15.66	11.0			393	400	7.0	7.0
1562732.0	540525.0	4.6	15.66	11.1	13.5	2.2	490	500	10.0	5.0
1562732.0	540634.0	4.2	15.66	11.5			599	600	1.0	5.0
1562720.0	540730.0	4.4	15.66	11.3			695	700	5.0	-7.0
1562723.0	540831.0	4.1	15.66	11.6			796	800	4.0	-4.0
1562720.0	540927.0	4.1	15.66	11.6			892	900	8.0	-7.0
1562723.0	541033.0	4.0	15.66	11.7	13.0	2.7	998	1000	2.0	-4.0
1562730.0	541133.0	4.2	15.66	11.5			1098	1100	2.0	3.0
1562725.0	541230.0	3.8	15.66	11.9			1195	1200	5.0	-2.0
1562727.0	541340.0	3.9	15.66	11.8			1305	1300	-5.0	0.0
1562726.0	541432.0	3.8	15.66	11.9			1397	1400	3.0	-1.0
1562726.0	541541.0	4.1	15.66	11.6	12.5	3.2	1506	1500	-6.0	-1.0
1562722.0	541633.0	3.6	15.66	12.1			1598	1600	2.0	-5.0
1562722.0	541732.0	3.4	15.66	12.3			1697	1700	3.0	-5.0
1562722.0	541834.0	2.4	15.66	13.3			1799	1800	1.0	-5.0
1562721.0	541933.0	3.8	15.66	11.9			1898	1900	2.0	-6.0
1562719.0	542036.0	4.2	15.66	11.5	13.0	2.7	2001	2000	-1.0	-8.0
1562720.0	542132.0	3.1	15.66	12.6			2097	2100	3.0	-7.0
1562721.0	542233.0	2.9	15.66	12.8			2198	2200	2.0	-6.0
1562721.0	542334.0	3.0	15.66	12.7			2299	2300	1.0	-6.0
1562723.0	542438.0	2.6	15.66	13.1			2403	2400	-3.0	-4.0
1562722.0	542542.0	3.0	15.66	12.7	12.5	3.2	2507	2500	-7.0	-5.0
1562743.0	542634.0	1.6	15.66	14.1			2599	2600	1.0	16.0
1562747.0	542654.0	1.0	15.66	14.7	13.1	2.6	2619	2700	81.0	20.0
								AVG	4.6	-0.4
								STD	15.2	6.8

LINE 15_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1562228.0	539859.0	2.0	15.66	13.7	4.0	11.7	44	0	-44.0	1.0
1562226.0	539923.0	5.0	15.66	10.7			108	100	-8.0	-1.0
1562232.0	540014.0	6.0	15.66	9.7			199	200	1.0	5.0
1562233.0	540110.0	5.2	15.66	10.5			295	300	5.0	6.0
1562227.0	540207.0	4.0	15.66	11.7			392	400	8.0	0.0
1562232.0	540307.0	4.2	15.66	11.5	13.0	2.7	492	500	8.0	5.0
1562232.0	540407.0	4.4	15.66	11.3			592	600	8.0	5.0
1562227.0	540520.0	3.6	15.66	12.1			705	700	-5.0	0.0
1562225.0	540612.0	3.2	15.66	12.5			797	800	3.0	-2.0
1562227.0	540719.0	3.4	15.66	12.3			904	900	-4.0	0.0
1562227.0	540810.0	3.5	15.66	12.2	11.0	4.7	995	1000	5.0	0.0
1562229.0	540902.0	3.0	15.66	12.7			1087	1100	13.0	2.0
1562225.0	541008.0	3.4	15.66	12.3			1193	1200	7.0	-2.0
1562225.0	541101.0	3.6	15.66	12.1			1286	1300	14.0	-2.0
1562226.0	541224.0	3.3	15.66	12.4			1409	1400	-9.0	-1.0
1562219.0	541311.0	3.8	15.66	11.9	13.5	2.2	1496	1500	4.0	-8.0
1562219.0	541414.0	3.0	15.66	12.7			1599	1600	1.0	-8.0
1562219.0	541501.0	3.8	15.66	11.9			1686	1700	14.0	-8.0
1562224.0	541607.0	3.4	15.66	12.3			1792	1800	8.0	-3.0
1562222.0	541709.0	3.6	15.66	12.1			1894	1900	6.0	-5.0
1562217.0	541811.0	3.9	15.66	11.8	11.5	4.2	1996	2000	4.0	-10.0
1562218.0	541907.0	2.8	15.66	12.9			2092	2100	8.0	-9.0
1562221.0	542011.0	2.4	15.66	13.3			2196	2200	4.0	-6.0
1562220.0	542109.0	3.1	15.66	12.6			2294	2300	6.0	-7.0
1562213.0	542203.0	4.0	15.66	11.7			2388	2400	12.0	-14.0
1562234.0	542322.0	3.5	15.66	12.2	13.0	2.7	2507	2500	-7.0	7.0
1562229.0	542407.0	3.5	15.66	12.2			2592	2600	8.0	2.0
1562229.0	542506.0	3.8	15.66	11.9			2691	2700	9.0	2.0
1562249.0	542599.0	4.0	15.66	11.7			2784	2800	16.0	22.0
1562255.0	542720.0	3.8	15.66	11.9			2905	2900	-5.0	28.0
1562232.0	542803.0	2.9	15.66	12.8	12.5	3.2	2988	3000	12.0	5.0
1562260.0	542903.0	3.8	15.66	11.9			3088	3100	12.0	33.0
1562263.0	542932.0	3.7	15.66	12.0	13.0	2.7	3117	3200	83.0	36.0
								AVG	6.0	2.2
								STD	17.3	11.5

LINE 20_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1561727.0	539267.0	2.0	15.66	13.7	7.0	8.7	162	162	0.0	0.0
1561729.0	539301.0	2.4	15.66	13.3			196	200	4.0	2.0
1561723.0	539403.0	3.3	15.66	12.4			298	300	2.0	-4.0
1561732.0	539505.0	3.7	15.66	12.0			400	400	0.0	5.0
1561713.0	539600.0	3.6	15.66	12.1	5.0	10.7	495	500	5.0	-14.0
1561711.0	539716.0	4.2	15.66	11.5			611	600	-11.0	-16.0
1561723.0	539815.0	5.0	15.66	10.7			710	700	-10.0	-4.0
1561726.0	539918.0	4.9	15.66	10.8			813	800	-13.0	-1.0
1561723.0	540006.0	4.0	15.66	11.7			901	900	-1.0	-4.0
1561726.0	540102.0	4.7	15.66	11.0	13.0	2.7	997	1000	3.0	-1.0
1561728.0	540196.0	5.0	15.66	10.7			1091	1100	9.0	1.0
1561727.0	540314.0	3.2	15.66	12.5			1209	1200	-9.0	0.0
1561718.0	540396.0	4.4	15.66	11.3			1291	1300	9.0	-9.0
1561731.0	540500.0	3.3	15.66	12.4			1395	1400	5.0	4.0
1561728.0	540601.0	3.4	15.66	12.3	13.0	2.7	1496	1500	4.0	1.0
1561724.0	540700.0	3.3	15.66	12.4			1595	1600	5.0	-3.0
1561725.0	540793.0	2.8	15.66	12.9			1688	1700	12.0	-2.0
1561728.0	540911.0	4.0	15.66	11.7			1806	1800	-6.0	1.0
1561722.0	540996.0	3.3	15.66	12.4			1891	1900	9.0	-5.0
1561726.0	541102.0	3.5	15.66	12.2	13.5	2.2	1997	2000	3.0	-1.0
1561725.0	541203.0	2.9	15.66	12.8			2098	2100	2.0	-2.0
1561724.0	541310.0	3.4	15.66	12.3			2205	2200	-5.0	-3.0
1561724.0	541403.0	4.0	15.66	11.7			2298	2300	2.0	-3.0
1561725.0	541513.0	4.0	15.66	11.7			2408	2400	-8.0	-2.0
1561727.0	541609.0	3.0	15.66	12.7	13.0	2.7	2504	2500	-4.0	0.0
1561724.0	541709.0	2.5	15.66	13.2			2604	2600	-4.0	-3.0
1561727.0	541819.0	2.8	15.66	12.9			2714	2700	-14.0	0.0
1561726.0	541906.0	3.8	15.66	11.9			2801	2800	-1.0	-1.0
1561726.0	541999.0	3.6	15.66	12.1			2894	2900	6.0	-1.0
1561727.0	542107.0	4.0	15.66	11.7	12.0	3.7	3002	3000	-2.0	0.0
1561723.0	542200.0	2.5	15.66	13.2			3095	3100	5.0	-4.0
1561729.0	542300.0	2.6	15.66	13.1			3195	3200	5.0	2.0
1561728.0	542408.0	3.8	15.66	11.9			3303	3300	-3.0	1.0
1561729.0	542511.0	4.0	15.66	11.7			3406	3400	-6.0	2.0
1561729.0	542610.0	3.2	15.66	12.5	13.2	2.5	3505	3500	-5.0	2.0
1561731.0	542702.0	3.4	15.66	12.3			3597	3600	3.0	4.0
1561724.0	542802.0	3.3	15.66	12.4			3697	3700	3.0	-3.0
1561723.0	542906.0	4.0	15.66	11.7			3801	3800	-1.0	-4.0
1561726.0	543009.0	3.8	15.66	11.9			3904	3900	-4.0	-1.0
1561732.0	543091.0	4.0	15.66	11.7	13.0	2.7	3986	4000	14.0	5.0
								AVG	0.1	-1.5
								STD	6.6	4.2

LINE 25_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1561248.0	538975.0	2.2	15.66	13.5	7.0	8.7	160	100	-60.0	21.0
1561237.0	539016.0	2.4	15.66	13.3			201	200	-1.0	10.0
1561231.0	539130.0	2.6	15.66	13.1			315	300	-15.0	4.0
1561243.0	539254.0	2.8	15.66	12.9			439	400	-39.0	16.0
1561233.0	539397.0	3.4	15.66	12.3	4.5	11.2	582	500	-82.0	6.0
1561229.0	539455.0	3.4	15.66	12.3			640	600	-40.0	2.0
1561222.0	539524.0	3.4	15.66	12.3			709	700	-9.0	-5.0
1561235.0	539626.0	3.7	15.66	12.0			811	800	-11.0	8.0
1561240.0	539722.0	4.0	15.66	11.7			907	900	-7.0	13.0
1561222.0	539833.0	5.0	15.66	10.7	7.0	8.7	1018	1000	-18.0	-5.0
1561206.0	539943.0	5.0	15.66	10.7			1128	1100	-28.0	-21.0
1561214.0	540023.0	4.7	15.66	11.0			1208	1200	-8.0	-13.0
1561245.0	540125.0	4.4	15.66	11.3			1310	1300	-10.0	18.0
1561232.0	540218.0	4.1	15.66	11.6			1403	1400	-3.0	5.0
1561225.0	540316.0	4.0	15.66	11.7	13.0	2.7	1501	1500	-1.0	-2.0
1561230.0	540416.0	3.9	15.66	11.8			1601	1600	-1.0	3.0
1561233.0	540527.0	3.9	15.66	11.8			1712	1700	-12.0	6.0
1561217.0	540620.0	4.0	15.66	11.7			1805	1800	-5.0	-10.0
1561226.0	540712.0	4.0	15.66	11.7			1897	1900	3.0	-1.0
1561232.0	540808.0	3.7	15.66	12.0	12.5	3.2	1993	2000	7.0	5.0
1561229.0	540909.0	3.6	15.66	12.1			2094	2100	6.0	2.0
1561226.0	541017.0	3.6	15.66	12.1			2202	2200	-2.0	-1.0
1561233.0	541110.0	3.6	15.66	12.1			2295	2300	5.0	6.0
1561233.0	541216.0	3.2	15.66	12.5			2401	2400	-1.0	6.0
1561239.0	541323.0	3.0	15.66	12.7	13.5	2.2	2508	2500	-8.0	12.0
1561239.0	541431.0	3.0	15.66	12.7			2616	2600	-16.0	12.0
1561239.0	541524.0	3.3	15.66	12.4			2709	2700	-9.0	12.0
1561236.0	541626.0	3.1	15.66	12.6			2811	2800	-11.0	9.0
1561238.0	541710.0	3.7	15.66	12.0			2895	2900	5.0	11.0
1561234.0	541819.0	3.7	15.66	12.0	13.0	2.7	3004	3000	-4.0	7.0
1561232.0	541927.0	3.5	15.66	12.2			3112	3100	-12.0	5.0
1561230.0	542045.0	3.7	15.66	12.0			3230	3200	-30.0	3.0
1561231.0	542160.0	3.8	15.66	11.9			3345	3300	-45.0	4.0
1561234.0	542246.0	3.0	15.66	12.7			3431	3400	-31.0	7.0
1561238.0	542316.0	3.4	15.66	12.3	11.1	4.6	3501	3500	-1.0	11.0
1561236.0	542421.0	3.6	15.66	12.1			3606	3600	-6.0	9.0
1561227.0	542535.0	4.0	15.66	11.7			3720	3700	-20.0	0.0
1561226.0	542630.0	3.8	15.66	11.9			3815	3800	-15.0	-1.0
1561229.0	542715.0	4.3	15.66	11.4			3900	3900	0.0	2.0
1561227.0	542818.0	4.2	15.66	11.5	13.0	2.7	4003	4000	-3.0	0.0
1561224.0	542921.0	4.3	15.66	11.4			4106	4100	-6.0	-3.0
1561225.0	543019.0	4.3	15.66	11.4			4204	4200	-4.0	-2.0
1561226.0	543130.0	3.4	15.66	12.3			4315	4300	-15.0	-1.0
1561238.0	543202.0	4.0	15.66	11.7	13.5	2.2	4387	4400	13.0	11.0
								AVG	-12.5	4.1
								STD	18.0	7.9

LINE 30_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1560766.0	539170.0	2.9	15.68	12.8	4.2	11.5	465	400	-65.0	39.0
1560751.0	539214.0	3.5	15.68	12.2			509	500	-9.0	24.0
1560748.0	539294.0	3.6	15.68	12.1			589	600	11.0	21.0
1560747.0	539407.0	3.8	15.68	11.9			702	700	-2.0	20.0
1560742.0	539526.0	3.6	15.68	12.1			821	800	-21.0	15.0
1560720.0	539602.0	4.1	15.68	11.6			897	900	3.0	-7.0
1560753.0	539773.0	4.0	15.68	11.7	6.3	9.4	1068	1000	-68.0	26.0
1560761.0	539840.0	4.5	15.68	11.2			1135	1100	-35.0	34.0
1560742.0	539923.0	4.8	15.68	10.9			1218	1200	-18.0	15.0
1560720.0	540038.0	5.3	15.68	10.4			1333	1300	-33.0	-7.0
1560700.0	540108.0	5.2	15.68	10.5			1403	1400	-3.0	-27.0
1560710.0	540206.0	4.7	15.68	11.0	8.7	7.0	1501	1500	-1.0	-17.0
1560719.0	540313.0	4.3	15.68	11.4			1608	1600	-8.0	-8.0
1560713.0	540413.0	4.0	15.68	11.7			1708	1700	-8.0	-14.0
1560733.0	540512.0	4.0	15.68	11.7			1807	1800	-7.0	6.0
1560708.0	540611.0	3.8	15.68	11.9			1906	1900	-6.0	-19.0
1560715.0	540706.0	3.8	15.68	11.9	13.1	2.6	2001	2000	-1.0	-12.0
1560756.0	540804.0	3.9	15.68	11.8			2099	2100	1.0	29.0
1560725.0	540912.0	4.0	15.68	11.7			2207	2200	-7.0	-2.0
1560738.0	541009.0	4.2	15.68	11.5			2304	2300	-4.0	11.0
1560772.0	541106.0	4.1	15.68	11.6			2401	2400	-1.0	45.0
1560721.0	541214.0	4.1	15.68	11.6	13.5	2.2	2509	2500	-9.0	-6.0
1560729.0	541312.0	3.4	15.68	12.3			2607	2600	-7.0	2.0
1560738.0	541401.0	3.1	15.68	12.6			2696	2700	4.0	11.0
1560765.0	541528.0	3.0	15.68	12.7			2823	2800	-23.0	38.0
1560769.0	541619.0	4.0	15.68	11.7			2914	2900	-14.0	42.0
1560752.0	541708.0	4.0	15.68	11.7	13.6	2.1	3003	3000	-3.0	25.0
1560697.0	541804.0	4.0	15.68	11.7			3099	3100	1.0	-30.0
1560684.0	541892.0	4.0	15.68	11.7			3187	3200	13.0	-43.0
1560705.0	542001.0	3.8	15.68	11.9			3296	3300	4.0	-22.0
1560730.0	542141.0	3.8	15.68	11.9			3436	3400	-36.0	3.0
1560724.0	542195.0	3.4	15.68	12.3	10.7	5.0	3490	3500	10.0	-3.0
1560724.0	542296.0	3.7	15.68	12.0			3591	3600	9.0	-3.0
1560739.0	542429.0	3.6	15.68	12.1			3724	3700	-24.0	12.0
1560751.0	542509.0	3.6	15.68	12.1			3804	3800	-4.0	24.0
1560772.0	542598.0	3.4	15.68	12.3			3893	3900	7.0	45.0
1560777.0	542684.0	3.4	15.68	12.3	13.8	1.9	3979	4000	21.0	50.0
1560720.0	542810.0	3.8	15.68	11.9			4105	4100	-5.0	-7.0
1560648.0	542905.0	3.0	15.68	12.7			4200	4200	0.0	-79.0
1560632.0	543013.0	2.8	15.68	12.9			4308	4300	-8.0	-95.0
1560686.0	543103.0	4.0	15.68	11.7			4398	4400	2.0	-41.0
1560770.0	543206.0	3.8	15.68	11.9	13.2	2.5	4501	4500	-1.0	43.0
1560738.0	543311.0	4.0	15.68	11.7			4606	4600	-6.0	11.0
1560708.0	543417.0	3.4	15.68	12.3			4712	4700	-12.0	-19.0
1560654.0	543509.0	3.4	15.68	12.3	13.6	2.1	4804	4800	-4.0	-73.0
								AVG	-8.2	1.3
								STD	17.2	32.4

LINE 35_00

Northing	Easting	Water Depth	Corr.	Bottom el.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1560245.0	539464.0	1.2	15.68	14.5	5.9	9.8	629	600	-29.0	18.0
1560238.0	539535.0	3.5	15.68	12.2			700	700	0.0	11.0
1560248.0	539641.0	3.6	15.68	12.1			806	800	-6.0	21.0
1560249.0	539765.0	3.7	15.68	12.0			930	900	-30.0	22.0
1560249.0	539846.0	3.8	15.68	11.9	5.1	10.6	1011	1000	-11.0	22.0
1560254.0	539941.0	3.9	15.68	11.8			1106	1100	-6.0	27.0
1560221.0	540040.0	4.4	15.68	11.3			1205	1200	-5.0	-6.0
1560249.0	540149.0	4.6	15.68	11.1			1314	1300	-14.0	22.0
1560245.0	540279.0	4.6	15.68	11.1			1444	1400	-44.0	18.0
1560222.0	540338.0	4.6	15.68	11.1	8.9	6.8	1503	1500	-3.0	-5.0
1560252.0	540467.0	4.4	15.68	11.3			1632	1600	-32.0	25.0
1560259.0	540564.0	4.0	15.68	11.7			1729	1700	-29.0	32.0
1560241.0	540646.0	3.9	15.68	11.8			1811	1800	-11.0	14.0
1560245.0	540733.0	4.0	15.68	11.7			1898	1900	2.0	18.0
1560267.0	540839.0	4.0	15.68	11.7	12.9	2.8	2004	2000	-4.0	40.0
1560221.0	540942.0	4.0	15.68	11.7			2107	2100	-7.0	-6.0
1560253.0	541029.0	4.0	15.68	11.7			2194	2200	6.0	26.0
1560219.0	541131.0	4.2	15.68	11.5			2296	2300	4.0	-8.0
1560249.0	541235.0	4.1	15.68	11.6			2400	2400	0.0	22.0
1560259.0	541334.0	3.9	15.68	11.8	12.0	3.7	2499	2500	1.0	32.0
1560221.0	541435.0	4.2	15.68	11.5			2600	2600	0.0	-6.0
1560236.0	541537.0	4.0	15.68	11.7			2702	2700	-2.0	9.0
1560240.0	541641.0	3.8	15.68	11.9			2806	2800	-6.0	13.0
1560220.0	541739.0	4.0	15.68	11.7			2904	2900	-4.0	-7.0
1560222.0	541844.0	4.2	15.68	11.5	13.2	2.5	3009	3000	-9.0	-5.0
1560224.0	541967.0	4.0	15.68	11.7			3132	3100	-32.0	-3.0
1560228.0	542081.0	3.8	15.68	11.9			3246	3200	-46.0	1.0
1560241.0	542159.0	4.3	15.68	11.4			3324	3300	-24.0	14.0
1560223.0	542297.0	4.0	15.68	11.7			3462	3400	-62.0	-4.0
1560222.0	542340.0	3.8	15.68	11.9	13.0	2.7	3505	3500	-5.0	-5.0
1560237.0	542464.0	4.2	15.68	11.5			3629	3600	-29.0	10.0
1560209.0	542560.0	3.7	15.68	12.0			3725	3700	-25.0	-18.0
1560229.0	542643.0	3.7	15.68	12.0			3808	3800	-8.0	2.0
1560231.0	542748.0	4.0	15.68	11.7			3913	3900	-13.0	4.0
1560218.0	542839.0	4.0	15.68	11.7	13.8	1.9	4004	4000	-4.0	-9.0
1560234.0	542951.0	3.7	15.68	12.0			4116	4100	-16.0	7.0
1560232.0	543045.0	3.9	15.68	11.8			4210	4200	-10.0	5.0
1560220.0	543139.0	3.9	15.68	11.8			4304	4300	-4.0	-7.0
1560258.0	543242.0	4.1	15.68	11.6			4407	4400	-7.0	31.0
1560194.0	543337.0	3.6	15.68	12.1	14.0	1.7	4502	4500	-2.0	-33.0
1560260.0	543431.0	4.5	15.68	11.2			4596	4600	4.0	33.0
1560228.0	543522.0	3.8	15.68	11.9			4687	4700	13.0	1.0
1560236.0	543598.0	4.1	15.68	11.6	13.9	1.8	4763	4800	37.0	9.0
								AVG	-11.0	9.0
								STD	17.0	15.6

LINE 40_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1559755.0	539936.0	2.0	15.68	13.7	10.2	5.5	41	0	-41.0	28.0
1559776.0	540002.0	3.5	15.68	12.2			107	100	-7.0	49.0
1559725.0	540090.0	4.0	15.68	11.7			195	200	5.0	-2.0
1559714.0	540196.0	4.4	15.68	11.3			301	300	-1.0	-13.0
1559791.0	540313.0	4.6	15.68	11.1			418	400	-18.0	64.0
1559742.0	540408.0	4.4	15.68	11.3	8.7	7.0	513	500	-13.0	15.0
1559683.0	540522.0	4.2	15.68	11.5			627	600	-27.0	-44.0
1559774.0	540601.0	4.2	15.68	11.5			706	700	-6.0	47.0
1559704.0	540706.0	4.0	15.68	11.7			811	800	-11.0	-23.0
1559714.0	540804.0	3.9	15.68	11.8			909	900	-9.0	-13.0
1559735.0	540944.0	4.0	15.68	11.7	13.4	2.3	1049	1000	-49.0	8.0
1559710.0	541035.0	4.0	15.68	11.7			1140	1100	-40.0	-17.0
1559705.0	541121.0	4.1	15.68	11.6			1226	1200	-26.0	-22.0
1559719.0	541198.0	4.0	15.68	11.7			1303	1300	-3.0	-8.0
1559749.0	541298.0	4.0	15.68	11.7			1403	1400	-3.0	22.0
1559713.0	541397.0	3.9	15.68	11.8	13.1	2.6	1502	1500	-2.0	-14.0
1559711.0	541503.0	3.8	15.68	11.9			1608	1600	-8.0	-16.0
1559736.0	541600.0	3.9	15.68	11.8			1705	1700	-5.0	9.0
1559733.0	541703.0	3.8	15.68	11.9			1808	1800	-8.0	6.0
1559710.0	541791.0	3.8	15.68	11.9			1896	1900	4.0	-17.0
1559722.0	541892.0	3.7	15.68	12.0	11.5	4.2	1997	2000	3.0	-5.0
1559731.0	542000.0	4.0	15.68	11.7			2105	2100	-5.0	4.0
1559712.0	542097.0	4.0	15.68	11.7			2202	2200	-2.0	-15.0
1559725.0	542201.0	4.0	15.68	11.7			2306	2300	-6.0	-2.0
1559726.0	542303.0	4.0	15.68	11.7			2408	2400	-8.0	-1.0
1559731.0	542404.0	3.8	15.68	11.9	13.8	1.9	2509	2500	-9.0	4.0
1559723.0	542499.0	3.6	15.68	12.1			2604	2600	-4.0	-4.0
1559728.0	542600.0	3.8	15.68	11.9			2705	2700	-5.0	1.0
1559736.0	542706.0	3.8	15.68	11.9			2811	2800	-11.0	9.0
1559724.0	542799.0	3.8	15.68	11.9			2904	2900	-4.0	-3.0
1559732.0	542890.0	4.0	15.68	11.7	12.7	3.0	2995	3000	5.0	5.0
1559730.0	542999.0	4.1	15.68	11.6			3104	3100	-4.0	3.0
1559722.0	543093.0	4.0	15.68	11.7			3198	3200	2.0	-5.0
1559713.0	543195.0	3.9	15.68	11.8			3300	3300	0.0	-14.0
1559707.0	543309.0	4.0	15.68	11.7			3414	3400	-14.0	-20.0
1559736.0	543401.0	3.9	15.68	11.8	8.4	7.3	3506	3500	-6.0	9.0
1559747.0	543500.0	4.1	15.68	11.6			3605	3600	-5.0	20.0
1559708.0	543591.0	4.0	15.68	11.7			3696	3700	4.0	-19.0
1559725.0	543702.0	2.8	15.68	12.9			3807	3800	-7.0	-2.0
1559744.0	543775.0	2.2	15.68	13.5	7.9	7.8	3880	3900	20.0	17.0
								AVG	-12.8	10.8
								STD	12.6	33.7

LINE 45_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1559222.7	539935.0		15.7		4.2	11.5	0	0	0	-4.3
1559219.0	540025.9	3.0	15.7	12.7			91	100	9.1	-8.0
1559224.4	540139.9	3.2	15.7	12.5			205	200	-4.9	-2.6
1559243.6	540226.7	4.0	15.7	11.7			292	300	8.3	16.6
1559207.4	540340.9	4.0	15.7	11.7			406	400	-5.9	-19.6
1559217.8	540443.6	4.0	15.7	11.7	7.6	8.1	509	500	-8.6	-9.2
1559245.4	540570.9	4.0	15.7	11.7			636	600	-35.9	18.4
1559242.0	540652.5	3.8	15.7	11.9			718	700	-17.5	15.0
1559212.8	540730.9	4.0	15.7	11.7			796	800	4.1	-14.2
1559227.4	540841.5	4.0	15.7	11.7			907	900	-6.5	0.4
1559247.0	540932.2	4.0	15.7	11.7	10.5	5.2	997	1000	2.8	20.0
1559216.8	541038.5	3.9	15.7	11.8			1104	1100	-3.5	-10.2
1559228.9	541146.0	4.0	15.7	11.7			1211	1200	-11	1.9
1559239.6	541234.3	4.0	15.7	11.7			1299	1300	0.7	12.6
1559213.8	541334.5	3.8	15.7	11.9			1400	1400	0.5	-13.2
1559243.5	541434.2	3.9	15.7	11.8	6.9	8.8	1499	1500	0.8	16.5
1559218.6	541539.6	4.1	15.7	11.6			1605	1600	-4.6	-8.4
1559201.6	541644.6	4.2	15.7	11.5			1710	1700	-9.6	-25.4
1559231.6	541743.6	4.0	15.7	11.7			1809	1800	-8.6	4.6
1559222.1	541846.7	4.1	15.7	11.6			1912	1900	-11.7	-4.9
1559218.5	541941.9	4.0	15.7	11.7	12.9	2.8	2007	2000	-6.9	-8.5
1559241.2	542048.2	4.0	15.7	11.7			2113	2100	-13.2	14.2
1559211.4	542140.9	4.2	15.7	11.5			2206	2200	-5.9	-15.6
1559225.6	542251.9	4.3	15.7	11.4			2317	2300	-16.9	-1.4
1559242.4	542339.1	4.5	15.7	11.2			2404	2400	-4.1	15.4
1559195.0	542438.8	4.3	15.7	11.4	13.7	2.0	2504	2500	-3.8	-32.0
1559213.3	542555.5	4.2	15.7	11.5			2621	2600	-20.5	-13.7
1559248.3	542634.5	4.0	15.7	11.7			2700	2700	0.5	21.3
1559234.6	542734.6	4.4	15.7	11.3			2800	2800	0.4	7.6
1559214.2	542844.1	4.5	15.7	11.2			2909	2900	-9.1	-12.8
1559263.5	542933.3	4.6	15.7	11.1	13.8	1.9	2998	3000	1.7	36.5
1559220.7	543042.9	4.2	15.7	11.5			3108	3100	-7.9	-6.3
1559212.3	543144.5	4.5	15.7	11.2			3210	3200	-9.5	-14.7
1559248.9	543245.2	4.2	15.7	11.5			3310	3300	-10.2	21.9
1559247.6	543334.5	4.0	15.7	11.7			3400	3400	0.5	20.6
1559225.1	543377.8		15.7		8.1	7.6	3443	3500	57.2	-1.9
								AVG	-4.2	0.5
								STD	13.3	15.5

LINE 50_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1558748.0	540115.2	1.6	15.7	14.1	9.6	6.1	0	0	-0.2	-21.0
1558750.6	540216.5	2.8	15.7	12.9			102	100	-1.5	-23.6
1558734.8	540323.7	3.8	15.7	11.9			209	200	-8.7	-7.8
1558743.9	540413.5	3.6	15.7	12.1			299	300	1.5	-16.9
1558729.8	540522.7	3.8	15.7	11.9			408	400	-7.7	-2.8
1558772.0	540633.4	4.0	15.7	11.7	10.5	5.2	518	500	-18.4	-45.0
1558764.2	540726.4	3.8	15.7	11.9			611	600	-11.4	-37.2
1558738.2	540825.3	3.7	15.7	12.0			710	700	-10.3	-11.2
1558697.9	540921.4	3.7	15.7	12.0			806	800	-6.4	29.1
1558712.1	541018.9	4.0	15.7	11.7			904	900	-3.9	14.9
1558726.1	541112.3	3.7	15.7	12.0	9.7	6.0	997	1000	2.7	0.9
1558718.0	541216.9	3.7	15.7	12.0			1102	1100	-1.9	9.0
1558715.5	541315.8	4.0	15.7	11.7			1201	1200	-0.8	11.5
1558717.6	541413.7	4.0	15.7	11.7			1299	1300	1.3	9.4
1558725.4	541513.3	3.9	15.7	11.8			1398	1400	1.7	1.6
1558720.6	541616.2	3.8	15.7	11.9	6.6	9.1	1501	1500	-1.2	6.4
1558711.6	541716.2	3.6	15.7	12.1			1601	1600	-1.2	15.4
1558733.3	541814.1	3.8	15.7	11.9			1699	1700	0.9	-6.3
1558723.9	541907.5	3.8	15.7	11.9			1793	1800	7.5	3.1
1558700.9	542015.3	3.8	15.7	11.9			1900	1900	-0.3	26.1
1558722.2	542108.8	4.0	15.7	11.7	9.4	6.3	1994	2000	6.2	4.8
1558728.8	542221.2	4.0	15.7	11.7			2106	2100	-6.2	-1.8
1558722.5	542311.8	4.4	15.7	11.3			2197	2200	3.2	4.5
1558745.8	542415.8	4.2	15.7	11.5			2301	2300	-0.8	-18.8
1558710.8	542512.8	4.0	15.7	11.7			2398	2400	2.2	16.2
1558706.6	542612.5	4.0	15.7	11.7	7.2	8.5	2498	2500	2.5	20.4
1558750.2	542719.4	4.0	15.7	11.7			2604	2600	-4.4	-23.2
1558746.1	542822.0	4.2	15.7	11.5			2707	2700	-7.0	-19.1
1558719.0	542922.3	4.0	15.7	11.7			2807	2800	-7.3	8.0
1558729.7	543019.5	4.2	15.7	11.5			2905	2900	-4.5	-2.7
1558758.0	543115.8	4.2	15.7	11.5	8.1	7.6	3001	3000	-0.8	-31.0
1558737.0	543225.6	4.0	15.7	11.7			3111	3100	-10.6	-10.0
1558713.0	543312.0	2.8	15.7	12.9			3197	3200	3.0	14.0
1558738.7	543346.5	3.6	15.7	12.1	4.3	11.4	3232	3300	68.5	-11.7
								AVG	-0.4	-2.8
								STD	13.2	17.5

LINE 55_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1558253.1	540036.0	1.6	15.7	14.1	6.8	8.9	11	0	-11.0	26.1
1558248.4	540148.7	2.6	15.7	13.1			124	100	-23.7	21.4
1558239.4	540245.6	2.8	15.7	12.9			221	200	-20.6	12.4
1558234.7	540338.2	2.8	15.7	12.9			313	300	-13.2	7.7
1558220.3	540446.8	3.4	15.7	12.3			422	400	-21.8	-6.7
1558227.8	540529.1	3.4	15.7	12.3	12.3	3.4	504	500	-4.1	0.8
1558266.1	540629.2	3.4	15.7	12.3			604	600	-4.2	39.1
1558242.9	540734.3	3.5	15.7	12.2			709	700	-9.3	15.9
1558196.3	540826.7	3.6	15.7	12.1			802	800	-1.7	-30.7
1558192.2	540935.8	3.6	15.7	12.1			911	900	-10.8	-34.8
1558228.8	541037.3	3.9	15.7	11.8	13.6	2.1	1012	1000	-12.3	1.8
1558229.0	541138.7	3.6	15.7	12.1			1114	1100	-13.7	2.0
1558227.8	541227.9	3.6	15.7	12.1			1203	1200	-2.9	0.8
1558238.1	541333.0	4.2	15.7	11.5			1308	1300	-8.0	11.1
1558198.0	541432.7	3.8	15.7	11.9			1408	1400	-7.7	-29.0
1558214.8	541530.4	3.8	15.7	11.9	14.0	1.7	1505	1500	-5.4	-12.2
1558275.5	541641.4	3.8	15.7	11.9			1616	1600	-16.4	48.5
1558189.2	541736.1	3.7	15.7	12.0			1711	1700	-11.1	-37.8
1558227.7	541833.8	3.7	15.7	12.0			1809	1800	-8.8	0.7
1558251.0	541925.2	3.8	15.7	11.9			1900	1900	-0.2	24.0
1558254.7	542019.0	4.0	15.7	11.7	7.6	8.1	1994	2000	6.0	27.7
1558262.1	542136.4	4.2	15.7	11.5			2111	2100	-11.4	35.1
1558256.2	542222.6	4.4	15.7	11.3			2198	2200	2.4	29.2
1558228.8	542329.9	4.4	15.7	11.3			2305	2300	-4.9	1.8
1558224.1	542425.3	4.5	15.7	11.2			2400	2400	-0.3	-2.9
1558227.7	542523.9	4.6	15.7	11.1	7.0	8.7	2499	2500	1.1	0.7
1558232.1	542646.2	4.4	15.7	11.3			2621	2600	-21.2	5.1
1558230.3	542723.1	4.5	15.7	11.2			2698	2700	1.9	3.3
1558212.9	542825.1	4.5	15.7	11.2			2800	2800	-0.1	-14.1
1558227.4	542927.0	4.6	15.7	11.1			2902	2900	-2.0	0.4
1558255.0	543031.4	4.6	15.7	11.1	6.2	9.5	3006	3000	-6.4	28.0
1558224.1	543132.4	4.5	15.7	11.2			3107	3100	-7.4	-2.9
1558184.8	543225.1	4.2	15.7	11.5			3200	3200	-0.1	-42.2
1558208.1	543326.9	4.0	15.7	11.7			3302	3300	-1.9	-18.9
1558255.8	543423.4	3.8	15.7	11.9			3398	3400	1.6	28.8
1558247.5	543526.2	4.0	15.7	11.7	12.1	3.6	3501	3500	-1.2	20.5
1558216.2	543623.3	4.0	15.7	11.7			3598	3600	1.7	-10.8
1558238.9	543725.4	4.2	15.7	11.5			3700	3700	-0.4	11.9
1558258.7	543755.0	1.6	15.7	14.1	5.6	10.1	3730	3800	70.0	31.7
								AVG	-4.6	5.0
								STD	14.1	21.7

LINE 60_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1557681.7	540080.4	1.8	15.5	13.7	7.4	8.1	175	100	-75.4	-45.3
1557680.5	540114.3	1.8	15.5	13.7			209	200	-9.3	-46.5
1557708.6	540216.9	2.0	15.5	13.5			312	300	-11.9	-18.4
1557718.6	540308.1	2.2	15.5	13.3			403	400	-3.1	-8.4
1557732.1	540400.4	2.8	15.5	12.7	6.3	9.2	495	500	4.6	5.1
1557742.9	540520.7	3.3	15.5	12.2			616	600	-15.7	15.9
1557755.8	540619.8	3.5	15.5	12.0			715	700	-14.8	28.8
1557750.5	540717.5	3.4	15.5	12.1			813	800	-12.5	23.5
1557752.5	540816.7	3.5	15.5	12.0			912	900	-11.7	25.5
1557796.2	540914.4	3.6	15.5	11.9	6.6	8.9	1009	1000	-9.4	69.2
1557779.8	541016.9	3.6	15.5	11.9			1112	1100	-11.9	52.8
1557662.2	541116.3	3.8	15.5	11.7			1211	1200	-11.3	-64.8
1557696.5	541215.2	3.7	15.5	11.8			1310	1300	-10.2	-30.5
1557757.4	541306.7	3.9	15.5	11.6			1402	1400	-1.7	30.4
1557698.1	541419.7	3.7	15.5	11.8	8.5	7.0	1515	1500	-14.7	-28.9
1557682.8	541521.4	3.8	15.5	11.7			1616	1600	-16.4	-44.2
1557662.1	541609.1	3.9	15.5	11.6			1704	1700	-4.1	-64.9
1557689.8	541706.4	3.8	15.5	11.7			1801	1800	-1.4	-37.2
1557714.9	541814.1	4.0	15.5	11.5			1909	1900	-9.1	-12.1
1557707.3	541912.3	4.3	15.5	11.2	12.5	3.0	2007	2000	-7.3	-19.7
1557747.6	542006.8	4.4	15.5	11.1			2102	2100	-1.8	20.6
1557733.2	542115.6	4.8	15.5	10.7			2211	2200	-10.6	6.2
1557718.0	542213.6	4.7	15.5	10.8			2309	2300	-8.6	-9.0
1557733.4	542304.2	4.6	15.5	10.9			2399	2400	0.8	6.4
1557726.2	542405.3	4.7	15.5	10.8	14.0	1.5	2500	2500	-0.3	-0.8
1557707.8	542516.7	4.9	15.5	10.6			2612	2600	-11.7	-19.2
1557707.3	542614.2	4.9	15.5	10.6			2709	2700	-9.2	-19.7
1557737.2	542718.7	5.2	15.5	10.3			2814	2800	-13.7	10.2
1557723.3	542823.7	5.2	15.5	10.3			2919	2900	-18.7	-3.7
1557703.8	542914.1	5.4	15.5	10.1	13.5	2.0	3009	3000	-9.1	-23.2
1557699.8	543010.1	5.3	15.5	10.2			3105	3100	-5.1	-27.2
1557733.7	543109.3	4.9	15.5	10.6			3204	3200	-4.3	6.7
1557727.4	543211.7	4.9	15.5	10.6			3307	3300	-6.7	0.4
1557713.8	543304.1	4.8	15.5	10.7			3399	3400	0.9	-13.2
1557721.1	543404.3	4.4	15.5	11.1	12.5	3.0	3499	3500	0.7	-5.9
1557749.8	543508.7	4.3	15.5	11.2			3604	3600	-3.7	22.8
1557751.9	543616.6	4.3	15.5	11.2			3712	3700	-11.6	24.9
1557692.5	543705.9	4.2	15.5	11.3			3801	3800	-0.9	-34.5
1557711.0	543807.4	4.1	15.5	11.4			3902	3900	-2.4	-16.0
1557784.9	543919.1	3.6	15.5	11.9	14.0	1.5	4014	4000	-14.1	57.9
1557781.5	544018.8	2.2	15.5	13.3	12.0	3.5	4114	4100	-13.8	54.5
								AVG	-9.5	-3.2
								STD	11.8	31.6

LINE 65_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1557198.3	540208.1	1.6	15.5	13.9	5.1	10.4	113	100	-13.1	-28.7
1557196.0	540314.7	1.8	15.5	13.7			220	200	-19.7	-31.0
1557202.7	540390.9	2.5	15.5	13.0			296	300	4.1	-24.3
1557216.2	540500.0	3.6	15.5	11.9			405	400	-5.0	-10.8
1557228.6	540598.3	3.7	15.5	11.8	9.0	6.5	503	500	-3.3	1.6
1557246.1	540699.3	3.7	15.5	11.8			604	600	-4.3	19.1
1557261.2	540804.5	3.6	15.5	11.9			710	700	-9.5	34.2
1557293.7	540911.4	3.7	15.5	11.8			816	800	-16.4	66.7
1557259.2	541000.1	3.8	15.5	11.7			905	900	-5.1	32.2
1557208.8	541100.6	3.7	15.5	11.8	5.2	10.3	1006	1000	-5.6	-18.2
1557212.0	541192.5	3.6	15.5	11.9			1098	1100	2.5	-15.0
1557196.9	541303.7	3.6	15.5	11.9			1209	1200	-8.7	-30.1
1557184.7	541394.9	3.8	15.5	11.7			1300	1300	0.1	-42.3
1557288.8	541493.1	3.6	15.5	11.9			1398	1400	1.9	61.8
1557239.9	541601.5	3.8	15.5	11.7	12.0	3.5	1507	1500	-6.5	12.9
1557125.5	541710.3	4.0	15.5	11.5			1615	1600	-15.3	-101.5
1557215.7	541791.9	3.6	15.5	11.9			1697	1700	3.1	-11.3
1557251.8	541893.9	3.8	15.5	11.7			1799	1800	1.1	24.8
1557135.0	542006.7	4.2	15.5	11.3			1912	1900	-11.7	-92.0
1557124.2	542101.0	4.4	15.5	11.1	13.0	2.5	2006	2000	-6.0	-102.8
1557168.3	542205.1	4.3	15.5	11.2			2110	2100	-10.1	-58.7
1557205.5	542301.4	4.2	15.5	11.3			2206	2200	-6.4	-21.5
1557192.1	542401.8	4.0	15.5	11.5			2307	2300	-6.8	-34.9
1557169.5	542499.4	4.4	15.5	11.1			2404	2400	-4.4	-57.5
1557227.0	542601.8	4.6	15.5	10.9	12.5	3.0	2507	2500	-6.8	0.0
1557252.3	542697.0	4.9	15.5	10.6			2602	2600	-2.0	25.3
1557275.2	542805.2	5.0	15.5	10.5			2710	2700	-10.2	48.2
1557207.0	542902.1	5.2	15.5	10.3			2807	2800	-7.1	-20.0
1557231.6	542997.0	5.3	15.5	10.2			2902	2900	-2.0	4.6
1557251.1	543094.2	5.1	15.5	10.4	13.0	2.5	2999	3000	0.8	24.1
1557244.6	543201.5	5.3	15.5	10.2			3107	3100	-6.5	17.6
1557225.3	543299.2	4.9	15.5	10.6			3204	3200	-4.2	-1.7
1557222.6	543393.9	5.0	15.5	10.5			3299	3300	1.1	-4.4
1557218.8	543494.1	4.8	15.5	10.7			3399	3400	0.9	-8.2
1557223.4	543604.2	4.7	15.5	10.8	12.5	3.0	3509	3500	-9.2	-3.6
1557205.5	543700.4	4.0	15.5	11.5			3605	3600	-5.4	-21.5
1557248.1	543795.4	4.7	15.5	10.8			3700	3700	-0.4	21.1
1557223.0	543900.5	4.3	15.5	11.2			3806	3800	-5.5	-4.0
1557240.0	544002.1	2.8	15.5	12.7	5.0	10.5	3907	3900	-7.1	13.0
								AVG	-5.4	-8.6
								STD	5.4	38.5

LINE 70_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1556699.9	540320.8	3.0	15.5	12.5	12.5	3.0	156	100	-55.8	-27.1
1556728.1	540356.7	3.2	15.5	12.3			192	200	8.3	1.1
1556742.9	540463.1	3.2	15.5	12.3			298	300	1.9	15.9
1556730.6	540568.0	3.3	15.5	12.2			403	400	-3.0	3.6
1556729.4	540667.3	3.2	15.5	12.3	6.5	9.0	502	500	-2.3	2.4
1556735.5	540773.4	3.8	15.5	11.7			608	600	-8.4	8.5
1556751.5	540889.9	3.9	15.5	11.6			725	700	-24.9	24.5
1556750.2	540994.6	3.8	15.5	11.7			830	800	-29.6	23.2
1556715.5	541075.5	3.8	15.5	11.7			911	900	-10.5	-11.5
1556702.6	541170.6	3.9	15.5	11.6	7.5	8.0	1006	1000	-5.6	-24.4
1556722.8	541267.4	3.7	15.5	11.8			1102	1100	-2.4	-4.2
1556721.9	541373.8	3.8	15.5	11.7			1209	1200	-8.8	-5.1
1556713.6	541467.7	3.8	15.5	11.7			1303	1300	-2.7	-13.4
1556695.1	541565.2	3.9	15.5	11.6			1400	1400	-0.2	-31.9
1556727.5	541670.5	3.9	15.5	11.6	12.0	3.5	1506	1500	-5.5	0.5
1556740.0	541792.8	4.0	15.5	11.5			1628	1600	-27.8	13.0
1556732.4	541861.3	3.8	15.5	11.7			1696	1700	3.7	5.4
1556711.6	541963.5	4.0	15.5	11.5			1799	1800	1.5	-15.4
1556698.2	542070.5	4.0	15.5	11.5			1906	1900	-5.5	-28.8
1556741.7	542170.4	4.1	15.5	11.4	9.0	6.5	2005	2000	-5.4	14.7
1556745.5	542260.5	3.8	15.5	11.7			2096	2100	4.5	18.5
1556737.1	542374.2	3.8	15.5	11.7			2209	2200	-9.2	10.1
1556712.5	542468.8	3.9	15.5	11.6			2304	2300	-3.8	-14.5
1556703.1	542568.4	4.2	15.5	11.3			2403	2400	-3.4	-23.9
1556747.4	542686.5	4.5	15.5	11.0	13.0	2.5	2522	2500	-21.5	20.4
1556731.8	542773.5	4.6	15.5	10.9			2609	2600	-8.5	4.8
1556714.5	542864.7	4.6	15.5	10.9			2700	2700	0.3	-12.5
1556691.8	542966.1	4.8	15.5	10.7			2801	2800	-1.1	-35.2
1556627.9	543063.1	4.9	15.5	10.6			2898	2900	1.9	-99.1
1556700.9	543169.6	4.8	15.5	10.7	13.0	2.5	3005	3000	-4.6	-26.1
1556705.6	543274.8	5.0	15.5	10.5			3110	3100	-9.8	-21.4
1556709.1	543376.5	5.0	15.5	10.5			3212	3200	-11.5	-17.9
1556784.0	543465.4	4.9	15.5	10.6			3300	3300	-0.4	57.0
1556786.1	543571.1	4.7	15.5	10.8			3406	3400	-6.1	59.1
1556674.4	543674.6	4.5	15.5	11.0	10.0	5.5	3510	3500	-9.6	-52.6
1556703.4	543767.6	4.5	15.5	11.0			3603	3600	-2.6	-23.6
1556749.8	543869.9	4.3	15.5	11.2			3705	3700	-4.9	22.8
1556738.2	543969.3	4.2	15.5	11.3			3804	3800	-4.3	11.2
1556748.5	544017.8	3.8	15.5	11.7	6.2	9.3	3853	3900	47.2	21.5
								AVG	-5.9	-3.9
								STD	14.2	28.0

LINE 75_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1556257.0	540247.6	1.6	15.5	13.9			-97	-100	-2.6	30.0
1556227.0	540352.1	2.4	15.5	13.1	6.2	9.3	7	0	-7.1	0.0
1556209.3	540470.6	2.6	15.5	12.9			126	100	-25.6	-17.7
1556206.0	540553.5	3.0	15.5	12.5			209	200	-8.5	-21.0
1556203.5	540657.2	3.0	15.5	12.5			312	300	-12.2	-23.5
1556211.8	540744.3	3.4	15.5	12.1			399	400	0.7	-15.2
1556223.6	540856.1	3.8	15.5	11.7	11.5	4.0	511	500	-11.1	-3.4
1556233.5	540950.5	4.0	15.5	11.5			606	600	-5.5	6.5
1556234.1	541050.8	4.1	15.5	11.4			706	700	-5.8	7.1
1556225.7	541147.5	3.9	15.5	11.6			803	800	-2.5	-1.3
1556205.5	541249.2	4.1	15.5	11.4			904	900	-4.2	-21.5
1556215.0	541337.8	4.1	15.5	11.4	11.6	3.9	993	1000	7.2	-12.0
1556234.3	541441.8	4.0	15.5	11.5			1097	1100	3.2	7.3
1556222.1	541548.2	3.9	15.5	11.6			1203	1200	-3.2	-4.9
1556187.6	541653.7	4.1	15.5	11.4			1309	1300	-8.7	-39.4
1556224.9	541748.6	4.0	15.5	11.5			1404	1400	-3.6	-2.1
1556236.7	541846.8	4.4	15.5	11.1	10.5	5.0	1502	1500	-1.8	9.7
1556233.2	541956.4	4.3	15.5	11.2			1611	1600	-11.4	6.2
1556194.8	542046.5	4.4	15.5	11.1			1702	1700	-1.5	-32.2
1556188.1	542149.7	4.1	15.5	11.4			1805	1800	-4.7	-38.9
1556253.5	542261.7	3.9	15.5	11.6			1917	1900	-16.7	26.5
1556181.2	542350.5	3.9	15.5	11.6	8.2	7.3	2006	2000	-5.5	-45.8
1556231.9	542460.6	4.0	15.5	11.5			2116	2100	-15.6	4.9
1556267.6	542563.5	3.8	15.5	11.7			2219	2200	-18.5	40.6
1556231.1	542647.4	4.0	15.5	11.5			2302	2300	-2.4	4.1
1556211.1	542746.5	3.9	15.5	11.6			2402	2400	-1.5	-15.9
1556212.9	542853.2	4.1	15.5	11.4	13.5	2.0	2508	2500	-8.2	-14.1
1556223.5	542948.8	4.4	15.5	11.1			2604	2600	-3.8	-3.5
1556167.4	543052.8	4.4	15.5	11.1			2708	2700	-7.8	-59.6
1556227.6	543141.2	4.6	15.5	10.9			2796	2800	3.8	0.6
1556242.7	543243.5	4.5	15.5	11.0			2899	2900	1.5	15.7
1556172.9	543344.2	4.5	15.5	11.0	9.3	6.2	2999	3000	0.8	-54.1
1556207.2	543445.9	4.4	15.5	11.1			3101	3100	-0.9	-19.8
1556258.7	543544.1	4.3	15.5	11.2			3199	3200	0.9	31.7
1556214.3	543646.4	4.0	15.5	11.5			3301	3300	-1.4	-12.7
1556198.1	543742.8	3.5	15.5	12.0			3398	3400	2.2	-28.9
1556225.2	543848.9	4.0	15.5	11.5	11.5	4.0	3504	3500	-3.9	-1.8
1556227.4	543946.0	3.6	15.5	11.9			3601	3600	-1.0	0.4
1556236.2	544044.3	3.4	15.5	12.1			3699	3700	0.7	9.2
1556247.4	544146.9	2.4	15.5	13.1			3802	3800	-1.9	20.4
1556264.8	544175.9	2.2	15.5	13.3	8.0	7.5	3831	3900	69.1	37.8
								AVG	-2.9	-5.6
								STD	13.1	23.3

LINE 80_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1555721.2	544092.0	1.5	15.5	14.0	6.2	9.3	-17	0	17.0	-5.8
1555718.2	543972.7	2.2	15.5	13.3			102	100	-2.3	-8.8
1555743.8	543880.0	4.0	15.5	11.5			195	200	5.0	16.8
1555724.8	543771.9	4.2	15.5	11.3			303	300	-3.1	-2.2
1555733.0	543667.6	4.0	15.5	11.5			407	400	-7.4	6.0
1555755.9	543573.0	4.0	15.5	11.5	6.0	9.5	502	500	-2.0	28.9
1555708.8	543464.4	4.0	15.5	11.5			611	600	-10.6	-18.2
1555689.6	543361.6	4.1	15.5	11.4			713	700	-13.4	-37.4
1555702.7	543273.6	4.3	15.5	11.2			801	800	-1.4	-24.3
1555714.1	543158.0	4.5	15.5	11.0			917	900	-17.0	-12.9
1555718.5	543062.4	4.4	15.5	11.1	9.0	6.5	1013	1000	-12.6	-8.5
1555723.4	542952.3	3.9	15.5	11.6			1123	1100	-22.7	-3.6
1555727.8	542863.5	4.0	15.5	11.5			1212	1200	-11.5	0.8
1555717.2	542772.9	3.7	15.5	11.8			1302	1300	-2.1	-9.8
1555685.1	542662.2	4.3	15.5	11.2			1413	1400	-12.8	-41.9
1555716.2	542570.1	4.1	15.5	11.4	9.0	6.5	1505	1500	-4.9	-10.8
1555729.1	542461.1	3.9	15.5	11.6			1614	1600	-13.9	2.1
1555704.0	542363.8	4.0	15.5	11.5			1711	1700	-11.2	-23.0
1555667.9	542260.5	4.0	15.5	11.5			1815	1800	-14.5	-59.1
1555727.3	542173.0	4.0	15.5	11.5			1902	1900	-2.0	0.3
1555765.3	542073.7	4.5	15.5	11.0	11.0	4.5	2001	2000	-1.3	38.3
1555736.0	541956.3	4.4	15.5	11.1			2119	2100	-18.7	9.0
1555714.1	541853.3	4.5	15.5	11.0			2222	2200	-21.7	-12.9
1555738.5	541754.8	4.0	15.5	11.5			2320	2300	-20.2	11.5
1555764.0	541662.4	4.3	15.5	11.2			2413	2400	-12.6	37.0
1555685.7	541564.8	4.5	15.5	11.0	13.0	2.5	2510	2500	-10.2	-41.3
1555668.0	541457.1	4.1	15.5	11.4			2618	2600	-17.9	-59.0
1555705.3	541364.9	4.3	15.5	11.2			2710	2700	-10.1	-21.7
1555657.8	541267.5	4.5	15.5	11.0			2808	2800	-7.5	-69.2
1555683.4	541175.0	4.3	15.5	11.2			2900	2900	0.0	-43.6
1555710.2	541063.5	4.1	15.5	11.4	10.6	4.9	3012	3000	-11.5	-16.8
1555722.5	540969.6	3.8	15.5	11.7			3105	3100	-5.4	-4.5
1555734.2	540870.6	3.7	15.5	11.8			3204	3200	-4.4	7.2
1555752.4	540773.7	4.2	15.5	11.3			3301	3300	-1.3	25.4
1555768.1	540667.9	3.8	15.5	11.7			3407	3400	-7.1	41.1
1555708.0	540567.5	3.2	15.5	12.3	5.0	10.5	3508	3500	-7.5	-19.0
1555703.0	540463.9	2.3	15.5	13.2	7.1	8.4	3611	3600	-11.1	-24.0
								AVG	-8.4	-9.6
								STD	7.8	26.3

LINE 85_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1555149.1	540587.6	1.8	15.5	13.7	10.0	5.5	-57	-57	0.0	-77.9
1555182.1	540643.7	3.0	15.5	12.5			-1	0	1.3	-44.9
1555241.7	540762.8	3.4	15.5	12.1			118	100	-17.8	14.7
1555237.3	540860.8	3.0	15.5	12.5			216	200	-15.8	10.3
1555195.7	540962.9	3.6	15.5	11.9			318	300	-17.9	-31.3
1555185.9	541048.7	3.6	15.5	11.9			404	400	-3.7	-41.1
1555219.5	541144.7	3.8	15.5	11.7	5.5	10.0	500	500	0.3	-7.5
1555216.9	541246.2	3.8	15.5	11.7			601	600	-1.2	-10.1
1555218.8	541344.1	4.0	15.5	11.5			699	700	0.9	-8.2
1555197.9	541454.3	4.1	15.5	11.4			809	800	-9.3	-29.1
1555204.0	541546.7	4.0	15.5	11.5			902	900	-1.7	-23.0
1555245.4	541650.2	4.2	15.5	11.3	8.8	6.7	1005	1000	-5.2	18.4
1555196.0	541748.8	4.2	15.5	11.3			1104	1100	-3.8	-31.0
1555188.0	541840.4	4.4	15.5	11.1			1195	1200	4.6	-39.0
1555207.2	541943.4	4.4	15.5	11.1			1298	1300	1.6	-19.8
1555225.1	542044.2	4.2	15.5	11.3			1399	1400	0.8	-1.9
1555226.3	542155.3	4.2	15.5	11.3	11.0	4.5	1510	1500	-10.3	-0.7
1555236.7	542257.9	4.2	15.5	11.3			1613	1600	-12.9	9.7
1555224.7	542352.8	4.4	15.5	11.1			1708	1700	-7.8	-2.3
1555209.4	542450.1	4.0	15.5	11.5			1805	1800	-5.1	-17.6
1555250.8	542548.1	3.8	15.5	11.7			1903	1900	-3.1	23.8
1555233.5	542651.1	3.8	15.5	11.7	8.0	7.5	2006	2000	-6.1	6.5
1555234.5	542753.0	4.0	15.5	11.5			2108	2100	-8.0	7.5
1555244.0	542853.4	4.2	15.5	11.3			2208	2200	-8.4	17.0
1555245.9	542948.2	4.0	15.5	11.5			2303	2300	-3.2	18.9
1555220.6	543065.6	4.0	15.5	11.5			2421	2400	-20.6	-6.4
1555180.9	543162.9	4.4	15.5	11.1	11.0	4.5	2518	2500	-17.9	-46.1
1555178.5	543244.8	15.0	15.5	0.5			2600	2600	0.2	-48.5
1555210.0	543351.1	15.0	15.5	0.5			2706	2700	-6.1	-17.0
1555216.5	543461.7	4.2	15.5	11.3			2817	2800	-16.7	-10.5
1555193.8	543558.8	7.0	15.5	8.5			2914	2900	-13.8	-33.2
1555199.1	543648.5	7.2	15.5	8.3	14.0	1.5	3004	3000	-3.5	-27.9
1555199.6	543741.3	7.4	15.5	8.1			3096	3100	3.7	-27.4
1555210.9	543843.7	9.0	15.5	6.5			3199	3200	1.3	-16.1
1555197.4	543954.2	8.0	15.5	7.5			3309	3300	-9.2	-29.6
1555212.5	544058.2	8.0	15.5	7.5			3413	3400	-13.2	-14.5
1555225.4	544152.2	7.4	15.5	8.1	15.0	0.5	3507	3500	-7.2	-1.6
1555238.8	544249.9	8.5	15.5	7.0			3605	3600	-4.9	11.8
1555253.1	544353.8	8.0	15.5	7.5			3709	3700	-8.8	26.1
1555265.9	544446.8	5.2	15.5	10.3			3802	3800	-1.8	38.9
1555279.7	544547.1	6.5	15.5	9.0	10.0	5.5	3902	3900	-2.1	52.7
								AVG	-6.2	-9.9
								STD	6.5	25.9

LINE 87_20

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1554956.7	540393.7	1.1	15.65	14.6	5.0	10.7	61	0	-61.3	-50.3
1554960.6	540340.3	1.4	15.65	14.3			115	100	-14.7	-46.4
1554946.9	540249.7	2.6	15.65	13.1			205	200	-5.3	-60.1
1554939.4	540141.2	1.8	15.65	13.9			314	300	-13.8	-67.6
1554913.4	540045.7	3.4	15.65	12.3			409	400	-9.3	-93.6
1554900.1	539947.7	2.2	15.65	13.5	6.8	8.9	507	500	-7.3	-106.9
1554899.1	539852.1	0.6	15.65	15.1			603	600	-2.9	-107.9
1554931.8	539741.6	1.8	15.65	13.9			713	700	-13.4	-75.2
1554959.0	539645.7	3.8	15.65	11.9			809	800	-9.3	-48.0
1554984.1	539550.7	2.2	15.65	13.5			904	900	-4.3	-22.9
1555009.8	539453.8	4.0	15.65	11.7	6.7	9.0	1001	1000	-1.2	2.8
1555034.6	539360.7	2.2	15.65	13.5			1094	1100	5.7	27.6
								AVG	-11.4	-54.0
								STD	16.1	39.7

LINE 90_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1554709.5	544028.5	1.6	15.5	13.9	5.5	10.0	87	100	13.5	-17.5
1554688.7	543916.6	2.0	15.5	13.5			198	200	1.6	-38.3
1554701.9	543817.2	4.0	15.5	11.5			298	300	2.2	-25.1
1554748.7	543713.4	3.6	15.5	11.9			402	400	-1.6	21.7
1554726.5	543615.8	3.8	15.5	11.7	6.5	9.0	499	500	0.8	-0.5
1554698.8	543506.9	3.8	15.5	11.7			608	600	-8.1	-28.2
1554707.0	543404.4	3.8	15.5	11.7			711	700	-10.6	-20.0
1554697.2	543310.0	4.0	15.5	11.5			805	800	-5.0	-29.8
1554692.9	543204.2	3.6	15.5	11.9			911	900	-10.8	-34.1
1554686.0	543108.2	3.6	15.5	11.9	9.0	6.5	1007	1000	-6.8	-41.0
1554699.3	543017.0	4.0	15.5	11.5			1098	1100	2.0	-27.7
1554776.2	542912.3	4.0	15.5	11.5			1203	1200	-2.7	49.2
1554759.3	542810.9	4.0	15.5	11.5			1304	1300	-4.1	32.3
1554732.7	542713.8	3.8	15.5	11.7			1401	1400	-1.2	5.7
1554721.7	542611.6	3.8	15.5	11.7	8.0	7.5	1503	1500	-3.4	-5.3
1554716.0	542517.1	3.6	15.5	11.9			1598	1600	2.1	-11.0
1554695.4	542414.7	4.0	15.5	11.5			1700	1700	-0.3	-31.6
1554736.8	542313.6	3.8	15.5	11.7			1801	1800	-1.4	9.8
1554727.8	542217.8	4.0	15.5	11.5			1897	1900	2.8	0.8
1554701.2	542113.6	4.0	15.5	11.5	8.5	7.0	2001	2000	-1.4	-25.8
1554748.4	542016.5	4.0	15.5	11.5			2099	2100	1.5	21.4
1554774.2	541916.0	4.0	15.5	11.5			2199	2200	1.0	47.2
1554702.8	541814.4	4.2	15.5	11.3			2301	2300	-0.6	-24.2
1554698.8	541715.8	4.2	15.5	11.3			2399	2400	0.8	-28.2
1554749.8	541612.3	4.0	15.5	11.5	9.0	6.5	2503	2500	-2.7	22.8
1554733.3	541501.3	4.0	15.5	11.5			2614	2600	-13.7	6.3
1554692.2	541411.2	4.2	15.5	11.3			2704	2700	-3.8	-34.8
1554779.2	541313.1	3.8	15.5	11.7			2802	2800	-1.9	52.2
1554722.8	541202.5	3.8	15.5	11.7			2913	2900	-12.5	-4.2
1554668.8	541107.6	3.8	15.5	11.7	5.5	10.0	3007	3000	-7.4	-58.2
1554719.5	541009.3	4.0	15.5	11.5			3106	3100	-5.7	-7.5
1554813.3	540903.5	3.8	15.5	11.7			3212	3200	-11.5	86.3
1554748.4	540810.6	3.8	15.5	11.7			3304	3300	-4.4	21.4
1554725.3	540713.8	3.6	15.5	11.9	6.5	9.0	3401	3400	-1.2	-1.7
								AVG	-2.8	-3.5
								STD	5.3	31.4

LINE 90_OOR

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1554710.0	540601.7	1.6	15.5	13.9			247	200	-46.7	-17.0
1554700.0	540687.9	3.2	15.5	12.3			333	300	-32.9	-27.0
1554737.4	540761.5	3.6	15.5	11.9			407	400	-6.5	10.4
1554729.4	540854.3	3.8	15.5	11.7			499	500	0.7	2.4
1554678.9	540955.4	3.8	15.5	11.7			600	600	-0.4	-48.1
1554759.9	541066.1	3.8	15.5	11.7			711	700	-11.1	32.9
1554676.6	541163.1	3.8	15.5	11.7			808	800	-8.1	-50.4
1554626.9	541249.3	4.0	15.5	11.5			894	900	5.7	-100.1
1554693.8	541349.7	4.0	15.5	11.5			995	1000	5.3	-33.2
1554712.8	541461.1	4.0	15.5	11.5			1106	1100	-6.1	-14.2
1554729.6	541559.3	4.2	15.5	11.3			1204	1200	-4.3	2.6
1554733.0	541652.8	4.2	15.5	11.3			1298	1300	2.2	6.0
1554734.6	541758.2	4.0	15.5	11.5			1403	1400	-3.2	7.6
1554692.8	541852.2	4.0	15.5	11.5			1497	1500	2.8	-34.2
1554702.8	541962.6	3.8	15.5	11.7			1608	1600	-7.6	-24.2
1554698.0	542059.7	3.8	15.5	11.7			1705	1700	-4.7	-29.0
1554749.7	542163.5	3.8	15.5	11.7			1809	1800	-8.5	22.7
1554744.4	542261.2	3.6	15.5	11.9			1906	1900	-6.2	17.4
1554704.6	542351.8	3.6	15.5	11.9			1997	2000	3.2	-22.4
1554756.3	542461.7	4.0	15.5	11.5			2107	2100	-6.7	29.3
1554741.4	542555.4	3.8	15.5	11.7			2200	2200	-0.4	14.4
1554759.3	542659.0	3.6	15.5	11.9			2304	2300	-4.0	32.3
1554725.9	542753.5	3.6	15.5	11.9			2399	2400	1.5	-1.1
1554706.0	542856.4	4.2	15.5	11.3			2501	2500	-1.4	-21.0
1554711.1	542952.8	4.0	15.5	11.5			2598	2600	2.2	-15.9
1554745.9	543053.3	3.8	15.5	11.7			2698	2700	1.7	18.9
1554741.4	543154.9	4.0	15.5	11.5			2800	2800	0.1	14.4
1554721.0	543245.2	3.8	15.5	11.7			2890	2900	9.8	-6.0
1554710.3	543352.4	3.8	15.5	11.7			2997	3000	2.6	-16.7
1554743.9	543455.9	3.6	15.5	11.9			3101	3100	-0.9	16.9
1554759.3	543559.9	3.8	15.5	11.7			3205	3200	-4.9	32.3
1554700.8	543660.6	3.6	15.5	11.9			3306	3300	-5.6	-26.2
1554721.2	543755.8	3.0	15.5	12.5			3401	3400	-0.8	-5.8
1554737.7	543850.7	3.2	15.5	12.3			3496	3500	4.3	10.7
1554730.0	543953.5	3.0	15.5	12.5			3599	3600	1.5	3.0
1554737.5	544013.5	2.2	15.5	13.3			3659	3700	41.5	10.5
								AVG	-2.4	-5.8
								STD	12.5	27.5

LINE 91_60

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff	Off Line
1554566.0	540363.7	3.9	15.65	11.8	7.6	8.1	-9	0	8.7	-1.0
1554585.6	540248.7	3.4	15.65	12.3			106	100	-6.3	18.6
1554585.7	540146.9	2.8	15.65	12.9			208	200	-8.1	18.7
1554592.4	540054.9	2.4	15.65	13.3			300	300	-0.1	25.4
1554587.6	539957.6	3.2	15.65	12.5			397	400	2.6	20.6
1554581.5	539844.2	3.2	15.65	12.5	9.0	6.7	511	500	-10.8	14.5
1554571.3	539743.5	3.4	15.65	12.3			612	600	-11.5	4.3
1554549.6	539654.2	2.3	15.65	13.4			701	700	-0.8	-17.4
1554534.5	539551.5	1.0	15.65	14.7			804	800	-3.5	-32.5
1554501.3	539446.0	0.4	15.65	15.3			909	900	-9.0	-65.7
1554474.8	539362.1	0.2	15.65	15.5	7.3	8.4	993	1000	7.1	-92.2
								AVG	-2.9	-9.7
								STD	6.7	37.1

LINE 95_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1554257.0	540358.0	3.8	15.45	11.7	5.0	10.5	3	0	-3.0	30.0
1554207.0	540461.0	3.8	15.45	11.7			106	100	-6.0	-20.0
1554215.0	540554.0	4.0	15.45	11.5			199	200	1.0	-12.0
1554204.0	540654.0	3.8	15.45	11.7			299	300	1.0	-23.0
1554245.0	540743.0	3.5	15.45	11.9			388	400	12.0	18.0
1554213.0	540852.0	3.1	15.45	12.3	5.5	10.0	497	500	3.0	-14.0
1554204.0	540956.0	3.1	15.45	12.3			601	600	-1.0	-23.0
1554240.0	541057.0	3.1	15.45	12.3			702	700	-2.0	13.0
1554207.0	541152.0	3.4	15.45	12.1			797	800	3.0	-20.0
1554231.0	541253.0	4.0	15.45	11.5			898	900	2.0	4.0
1554234.0	541352.0	4.1	15.45	11.3	6.0	9.5	997	1000	3.0	7.0
1554249.0	541456.0	4.0	15.45	11.5			1101	1100	-1.0	22.0
1554240.0	541555.0	4.1	15.45	11.3			1200	1200	0.0	13.0
1554233.0	541683.0	4.1	15.45	11.3			1328	1300	-28.0	6.0
1554228.0	541770.0	4.1	15.45	11.3			1415	1400	-15.0	1.0
1554215.0	541858.0	3.8	15.45	11.7	8.0	7.5	1503	1500	-3.0	-12.0
1554231.0	541949.0	3.8	15.45	11.7			1594	1600	6.0	4.0
1554247.0	542058.0	3.8	15.45	11.7			1703	1700	-3.0	20.0
1554215.0	542149.0	3.5	15.45	11.9			1794	1800	6.0	-12.0
1554216.0	542254.0	3.5	15.45	11.9			1899	1900	1.0	-11.0
1554256.0	542354.0	3.4	15.45	12.1	7.5	8.0	1999	2000	1.0	29.0
1554259.0	542455.0	3.8	15.45	11.7			2100	2100	0.0	32.0
1554230.0	542565.0	3.5	15.45	11.9			2210	2200	-10.0	3.0
1554225.0	542673.0	4.1	15.45	11.3			2318	2300	-18.0	-2.0
1554276.0	542759.0	4.0	15.45	11.5			2404	2400	-4.0	49.0
1554208.0	542854.0	3.8	15.45	11.7	11.0	4.5	2499	2500	1.0	-19.0
1554184.0	542957.0	4.0	15.45	11.5			2602	2600	-2.0	-43.0
1554281.0	543074.0	4.0	15.45	11.5			2719	2700	-19.0	54.0
1554293.0	543165.0	3.8	15.45	11.7			2810	2800	-10.0	66.0
1554280.0	543255.0	4.0	15.45	11.5			2900	2900	0.0	53.0
1554176.0	543352.0	3.5	15.45	11.9	10.0	5.5	2997	3000	3.0	-51.0
1554225.0	543450.0	3.1	15.45	12.3			3095	3100	5.0	-2.0
1554249.0	543569.0	3.1	15.45	12.3			3214	3200	-14.0	22.0
1554222.0	543660.0	2.4	15.45	13.1			3305	3300	-5.0	-5.0
1554206.0	543750.0	1.8	15.45	13.7			3395	3400	5.0	-21.0
1554234.0	543855.0	1.8	15.45	13.7	6.0	9.5	3500	3500	0.0	7.0
								AVG	-2.5	4.5
								STD	8.0	26.1

LINE 95_OOR

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1554257.0	540358.0	4.0	15.45	11.5			3	0	-3.0	30.0
1554319.0	540469.0	3.8	15.45	11.7			114	100	-14.0	92.0
1554317.0	540533.0	3.9	15.45	11.6			178	200	22.0	90.0
1554175.0	540650.0	4.0	15.45	11.5			295	300	5.0	-52.0
1554173.0	540741.0	3.5	15.45	11.9			386	400	14.0	-54.0
1554213.0	540852.0	3.5	15.45	11.9			497	500	3.0	-14.0
1554257.0	540936.0	3.5	15.45	11.9			581	600	19.0	30.0
1554240.0	541057.0	3.5	15.45	11.9			702	700	-2.0	13.0
1554244.0	541134.0	3.5	15.45	11.9			779	800	21.0	17.0
1554321.0	541271.0	3.8	15.45	11.7			916	900	-16.0	94.0
1554198.0	541343.0	4.0	15.45	11.5			988	1000	12.0	-29.0
1554219.0	541450.0	4.0	15.45	11.5			1095	1100	5.0	-8.0
1554228.0	541559.0	4.4	15.45	11.1			1204	1200	-4.0	1.0
1554192.0	541650.0	4.1	15.45	11.3			1295	1300	5.0	-35.0
1554230.0	541764.0	4.1	15.45	11.3			1409	1400	-9.0	3.0
1554205.0	541871.0	4.0	15.45	11.5			1516	1500	-16.0	-22.0
1554180.0	541976.0	3.8	15.45	11.7			1621	1600	-21.0	-47.0
1554252.0	542061.0	3.8	15.45	11.7			1706	1700	-6.0	25.0
1554186.0	542175.0	3.8	15.45	11.7			1820	1800	-20.0	-41.0
1554181.0	542235.0	3.8	15.45	11.7			1880	1900	20.0	-46.0
1554249.0	542359.0	3.5	15.45	11.9			2004	2000	-4.0	22.0
1554259.0	542455.0	3.8	15.45	11.7			2100	2100	0.0	32.0
1554232.0	542559.0	3.8	15.45	11.7			2204	2200	-4.0	5.0
1554258.0	542636.0	4.0	15.45	11.5			2281	2300	19.0	31.0
1554276.0	542759.0	4.0	15.45	11.5			2404	2400	-4.0	49.0
1554234.0	542860.0	3.8	15.45	11.7			2505	2500	-5.0	7.0
1554206.0	542947.0	3.8	15.45	11.7			2592	2600	8.0	-21.0
1554281.0	543074.0	4.1	15.45	11.3			2719	2700	-19.0	54.0
1554230.0	543172.0	3.5	15.45	11.9			2817	2800	-17.0	3.0
1554163.0	543262.0	4.1	15.45	11.3			2907	2900	-7.0	-64.0
1554226.0	543360.0	3.4	15.45	12.1			3005	3000	-5.0	-1.0
1554242.0	543475.0	3.8	15.45	11.7			3120	3100	-20.0	15.0
1554203.0	543526.0	3.5	15.45	11.9			3171	3200	29.0	-24.0
1554240.0	543602.0	3.5	15.45	11.9			3247	3300	53.0	13.0
1554241.0	543754.0	1.9	15.45	13.6			3399	3400	1.0	14.0
1554234.0	543855.0	1.3	15.45	14.1			3500	3500	0.0	7.0
								AVG	1.1	5.3
								STD	15.8	39.2

LINE 97_20

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1554022.4	540312.8	3.2	15.65	12.5	6.7	9.0	42	0	-42.2	15.4
1554017.9	540249.3	3.6	15.65	12.1			106	100	-5.7	10.9
1553987.3	540150.1	4.0	15.65	11.7			205	200	-4.9	-19.7
1553982.2	540046.8	4.2	15.65	11.5			308	300	-8.2	-24.8
1553964.9	539949.6	4.1	15.65	11.6			405	400	-5.4	-42.1
1553953.1	539848.5	4.4	15.65	11.3	7.3	8.4	507	500	-6.5	-53.9
1553956.5	539752.0	3.9	15.65	11.8			603	600	-3.0	-50.5
1553961.9	539646.5	4.8	15.65	10.9			709	700	-8.5	-45.1
1553953.7	539549.9	4.2	15.65	11.5			805	800	-5.1	-53.3
1553955.3	539448.2	4.4	15.65	11.3			907	900	-6.8	-51.7
1553957.0	539347.1	3.2	15.65	12.5	4.7	11.0	1008	1000	-7.9	-50.0
1553947.6	539278.4	2.0	15.65	13.7	4.0	11.7	1077	1100	23.4	-59.4
								AVG	-6.7	-35.4
								STD	13.5	24.4

LINE 100_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1553735.8	543590.2	1.0	15.5	14.5	5.0	10.5	45	0	-44.8	8.8
1553722.9	543533.9	2.6	15.5	12.9			101	100	-1.1	-4.1
1553758.5	543421.7	3.4	15.5	12.1			213	200	-13.3	31.5
1553748.4	543329.4	3.0	15.5	12.5			306	300	-5.6	21.4
1553774.2	543219.3	3.8	15.5	11.7			416	400	-15.7	47.2
1553743.2	543135.9	3.2	15.5	12.3	8.5	7.0	499	500	0.9	16.2
1553710.7	543028.7	4.0	15.5	11.5			606	600	-6.3	-16.3
1553737.9	542926.1	4.0	15.5	11.5			709	700	-8.9	10.9
1553764.5	542836.8	4.0	15.5	11.5			798	800	1.8	37.5
1553760.9	542706.6	4.0	15.5	11.5			928	900	-28.4	33.9
1553712.2	542621.1	4.0	15.5	11.5	12.0	3.5	1014	1000	-13.9	-14.8
1553694.1	542517.6	4.0	15.5	11.5			1117	1100	-17.4	-32.9
1553701.1	542415.7	4.0	15.5	11.5			1219	1200	-19.3	-25.9
1553745.8	542334.9	3.6	15.5	11.9			1300	1300	-0.1	18.8
1553772.5	542222.2	3.8	15.5	11.7			1413	1400	-12.8	45.5
1553701.7	542138.1	4.0	15.5	11.5	10.5	5.0	1497	1500	3.1	-25.3
1553704.1	542032.9	4.0	15.5	11.5			1602	1600	-2.1	-22.9
1553747.9	541923.2	4.0	15.5	11.5			1712	1700	-11.8	20.9
1553751.8	541837.2	4.2	15.5	11.3			1798	1800	2.2	24.8
1553694.0	541730.1	4.4	15.5	11.1			1905	1900	-4.9	-33.0
1553732.3	541634.7	4.4	15.5	11.1	6.6	8.9	2000	2000	-0.3	5.3
1553768.3	541532.3	3.6	15.5	11.9			2103	2100	-2.7	41.3
1553702.9	541422.1	3.4	15.5	12.1			2213	2200	-12.9	-24.1
1553667.1	541335.5	4.0	15.5	11.5			2300	2300	0.5	-59.9
1553749.7	541222.8	4.0	15.5	11.5			2412	2400	-12.2	22.7
1553748.6	541137.4	4.0	15.5	11.5	5.4	10.1	2498	2500	2.4	21.6
1553745.6	541012.9	4.0	15.5	11.5			2622	2600	-22.1	18.6
1553767.6	540940.8	3.4	15.5	12.1			2694	2700	5.8	40.6
1553745.5	540838.1	3.0	15.5	12.5			2797	2800	3.1	18.5
1553714.3	540730.4	3.0	15.5	12.5			2905	2900	-4.6	-12.7
1553696.7	540633.0	2.4	15.5	13.1	7.3	8.2	3002	3000	-2.0	-30.3
1553692.8	540524.6	1.8	15.5	13.7			3110	3100	-10.4	-34.2
1553800.2	540432.2	1.6	15.5	13.9			3203	3200	-2.8	73.2
1553761.5	540335.4	1.6	15.5	13.9	6.9	8.6	3300	3300	0.4	34.5
								AVG	-7.5	7.6
								STD	10.4	30.1

LINE 102_30

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1553797.1	538742.8	2.2	15.65	13.5	6.1	9.6	688	600	-87.8	300.1
1553792.8	538769.5	2.0	15.65	13.7			715	700	-14.5	295.8
1553762.6	538863.8	2.0	15.65	13.7			809	800	-8.8	265.6
1553713.2	538959.6	2.2	15.65	13.5			905	900	-4.6	216.2
1553632.5	539063.2	1.8	15.65	13.9	4.1	11.6	1008	1000	-8.2	135.5
1553519.2	539169.8	2.2	15.65	13.5			1115	1100	-14.8	22.2
1553509.0	539270.9	4.5	15.65	11.2			1216	1200	-15.9	12.0
1553501.1	539366.2	4.3	15.65	11.4			1311	1300	-11.2	4.1
1553462.1	539459.0	4.2	15.65	11.5			1404	1400	-4.0	-34.9
1553419.6	539552.0	1.8	15.65	13.9	4.6	11.1	1497	1500	3.0	-77.4
1553409.6	539667.0	2.2	15.65	13.5			1612	1600	-12.0	-87.4
1553395.8	539757.5	2.4	15.65	13.3			1703	1700	-2.5	-101.2
1553379.5	539865.0	3.4	15.65	12.3			1810	1800	-10.0	-117.5
1553363.7	539969.3	2.6	15.65	13.1			1914	1900	-14.3	-133.3
1553350.6	540055.6	2.0	15.65	13.7	4.7	11.0	2001	2000	-0.6	-146.4
1553335.1	540157.7	1.6	15.65	14.1			2103	2100	-2.7	-161.9
1553320.1	540256.5	1.8	15.65	13.9			2202	2200	-1.5	-176.9
1553313.2	540301.7	2.0	15.65	13.7	4.7	11.0	2247	2300	53.3	-183.8
								AVG	-8.7	1.7
								STD	24.3	163.8

LINE 105_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1553217.1	543305.0	2.0	15.5	13.5	5.2	10.3	320	300	-20.0	-9.9
1553259.4	543221.2	2.0	15.5	13.5			404	400	-3.8	32.4
1553247.0	543116.9	3.0	15.5	12.5	6.9	8.6	508	500	-8.1	20.0
1553289.0	543026.4	4.0	15.5	11.5			599	600	1.4	62.0
1553282.8	542920.7	4.6	15.5	10.9			704	700	-4.3	55.8
1553222.3	542817.6	4.4	15.5	11.1			807	800	-7.4	-4.7
1553211.7	542715.0	4.0	15.5	11.5			910	900	-10.0	-15.3
1553173.6	542621.5	4.0	15.5	11.5	6.1	9.4	1004	1000	-3.5	-53.4
1553202.4	542520.2	4.4	15.5	11.1			1105	1100	-4.8	-24.6
1553283.0	542416.8	4.2	15.5	11.3			1208	1200	-8.2	56.0
1553281.4	542316.5	4.4	15.5	11.1			1309	1300	-8.5	54.4
1553234.7	542228.2	4.2	15.5	11.3			1397	1400	3.2	7.7
1553251.4	542114.9	4.6	15.5	10.9	7.4	8.1	1510	1500	-10.1	24.4
1553249.8	542009.4	4.4	15.5	11.1			1616	1600	-15.6	22.8
1553249.0	541909.4	4.0	15.5	11.5			1716	1700	-15.6	22.0
1553242.7	541811.5	4.0	15.5	11.5			1814	1800	-13.5	15.7
1553251.5	541716.9	4.0	15.5	11.5			1908	1900	-8.1	24.5
1553233.2	541616.4	4.2	15.5	11.3	5.9	9.6	2009	2000	-8.6	6.2
1553242.1	541517.6	4.4	15.5	11.1			2107	2100	-7.4	15.1
1553250.1	541411.3	3.8	15.5	11.7			2214	2200	-13.7	23.1
1553237.9	541325.2	4.2	15.5	11.3			2300	2300	0.2	10.9
1553237.4	541222.6	3.8	15.5	11.7			2402	2400	-2.4	10.4
1553260.5	541117.9	2.8	15.5	12.7	7.1	8.4	2507	2500	-7.1	33.5
1553252.8	541012.2	3.0	15.5	12.5			2613	2600	-12.8	25.8
1553239.4	540914.9	2.8	15.5	12.7			2710	2700	-10.1	12.4
1553245.8	540868.4	2.0	15.5	13.5	8.9	6.6	2757	2800	43.4	18.8
								AVG	-6.0	17.2
								STD	11.2	25.2

LINE 108_90

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1552844.8	538448.7	2.0	15.65	13.7	5.6	10.1	996	1000	3.7	7.8
1552831.8	538339.7	4.0	15.65	11.7			1105	1100	-5.3	-5.2
1552817.0	538244.9	2.4	15.65	13.3			1200	1200	-0.1	-20.0
1552820.4	538159.6	1.8	15.65	13.9	5.0	10.7	1285	1300	14.6	-16.6
								AVG	3.2	-8.5
								STD	7.3	10.9

LINE 110_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1552679.3	541008.8	2.0	15.5	13.5	7.9	7.6	34	0	-33.8	-47.7
1552698.6	541090.0	2.0	15.5	13.5			115	100	-15.0	-28.4
1552722.1	541180.6	3.0	15.5	12.5			206	200	-5.6	-4.9
1552742.1	541290.5	2.8	15.5	12.7			316	300	-15.5	15.1
1552742.1	541384.5	3.2	15.5	12.3			410	400	-9.5	15.1
1552724.8	541475.9	3.4	15.5	12.1	6.8	8.7	501	500	-0.9	-2.2
1552750.4	541578.2	3.2	15.5	12.3			603	600	-3.2	23.4
1552725.3	541677.5	3.4	15.5	12.1			703	700	-2.5	-1.7
1552743.0	541775.0	3.6	15.5	11.9			800	800	0.0	16.0
1552713.0	541875.6	3.4	15.5	12.1			901	900	-0.6	-14.0
1552709.0	541972.7	4.0	15.5	11.5	5.6	9.9	998	1000	2.3	-18.0
1552743.3	542073.9	4.0	15.5	11.5			1099	1100	1.1	16.3
1552705.0	542176.8	4.0	15.5	11.5			1202	1200	-1.8	-22.0
1552715.2	542271.6	4.2	15.5	11.3			1297	1300	3.4	-11.8
1552742.6	542374.3	3.8	15.5	11.7			1399	1400	0.7	15.6
1552726.7	542472.7	3.8	15.5	11.7	6.6	8.9	1498	1500	2.3	-0.3
1552734.1	542570.0	3.8	15.5	11.7			1595	1600	5.0	7.1
1552746.0	542669.8	3.4	15.5	12.1			1695	1700	5.2	19.0
1552734.4	542770.0	3.2	15.5	12.3			1795	1800	5.0	7.4
1552727.3	542870.7	2.4	15.5	13.1			1896	1900	4.3	0.3
1552736.0	542974.8	2.4	15.5	13.1	8.3	7.2	2000	2000	0.2	9.0
1552735.8	543069.3	2.8	15.5	12.7			2094	2100	5.7	8.8
1552734.1	543124.9	1.8	15.5	13.7	5.6	9.9	2150	2200	50.1	7.1
								AVG	-0.1	0.4
								STD	13.8	17.1

LINE 113_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1552423.6	539210.9	1.6	15.65	14.1	5.8	9.9	24	0	-24.1	-3.4
1552410.1	539129.2	4.1	15.65	11.6			106	100	-5.8	-16.9
1552405.3	539028.2	4.4	15.65	11.3			207	200	-6.8	-21.7
1552413.5	538918.6	3.8	15.65	11.9			316	300	-16.4	-13.5
1552426.1	538828.6	4.2	15.65	11.5			406	400	-6.4	-0.9
1552437.0	538731.6	3.6	15.65	12.1	6.2	9.5	503	500	-3.4	10.0
1552442.3	538625.5	3.8	15.65	11.9			610	600	-9.5	15.3
1552442.5	538533.5	1.6	15.65	14.1			702	700	-1.5	15.5
1552437.2	538425.8	2.4	15.65	13.3			809	800	-9.2	10.2
1552428.5	538331.2	3.0	15.65	12.7			904	900	-3.8	1.5
1552421.1	538233.5	1.8	15.65	13.9	6.0	9.7	1002	1000	-1.5	-5.9
1552416.5	538132.1	1.6	15.65	14.1			1103	1100	-2.9	-10.5
1552412.3	538094.3	1.8	15.65	13.9			1141	1200	59.3	-14.7
								AVG	-2.5	-2.7
								STD	18.9	12.1

LINE 115_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1552213.5	541738.8	1.4	15.5	14.1	9.5	6.0	-166	-200	-33.8	-13.5
1552257.4	541804.1	1.8	15.5	13.7			-101	-100	0.9	30.4
1552253.9	541909.4	1.8	15.5	13.7	7.3	8.2	4	0	-4.4	26.9
1552238.3	542007.3	2.4	15.5	13.1			102	100	-2.3	11.3
1552220.7	542117.6	2.2	15.5	13.3			213	200	-12.6	-6.3
1552201.9	542214.8	1.4	15.5	14.1			310	300	-9.8	-25.1
1552233.1	542305.7	2.0	15.5	13.5			401	400	-0.7	6.1
1552266.8	542409.9	3.2	15.5	12.3	8.7	6.8	505	500	-4.9	39.8
1552202.0	542510.0	2.0	15.5	13.5			605	600	-5.0	-25.0
1552233.4	542604.5	3.4	15.5	12.1			700	700	0.5	6.4
1552252.5	542712.5	3.0	15.5	12.5			808	800	-7.5	25.5
1552211.9	542818.7	2.0	15.5	13.5			914	900	-13.7	-15.1
1552206.1	542900.5	2.0	15.5	13.5	7.1	8.4	996	1000	4.5	-20.9
1552261.3	543005.2	2.6	15.5	12.9			1100	1100	-0.2	34.3
1552300.1	543140.0	1.8	15.5	13.7	6.6	8.9	1235	1200	-35.0	73.1
								AVG	-8.3	9.9
								STD	11.4	27.4

LINE 117_80

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1552001.5	538143.8	0.8	15.65	14.9	4.5	11.2	509	500	-8.8	54.5
1551820.9	538247.2	4.2	15.65	11.5			612	600	-12.2	-126.1
1551850.5	538342.3	2.8	15.65	12.9			707	700	-7.3	-96.5
1551881.4	538441.2	1.8	15.65	13.9	4.7	11.0	806	800	-6.2	-65.6
1551903.7	538468.5	0.4	15.65	15.3			834	900	66.5	-43.3
								AVG	6.4	-55.4
								STD	30.1	61.7

LINE 122_50

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1551216.9	538291.8	1.6	15.64	14.0	5.6	10.0	-237	-200	36.8	-260.1
1551218.3	538156.3	2.2	15.64	13.4			-101	-100	1.3	-258.7
1551218.3	538045.7	3.2	15.64	12.4	5.7	9.9	9	0	-9.3	-258.7
1551219.8	537948.4	3.0	15.64	12.6			107	100	-6.6	-257.2
1551221.1	537845.3	3.8	15.64	11.8			210	200	-9.7	-255.9
1551220.1	537744.1	3.8	15.64	11.8			311	300	-10.9	-256.9
1551224.9	537650.6	3.4	15.64	12.2			404	400	-4.4	-252.1
1551230.0	537547.0	1.4	15.64	14.2	5.5	10.1	508	500	-8.0	-247.0
								AVG	-1.3	-255.8
								STD	14.9	4.0

LINE 129_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1550827.0	538789.7	0.8	15.64	14.8	4.5	11.1	45	0	-45.3	0.0
1550824.9	538722.5	2.0	15.64	13.6			113	100	-12.5	-2.1
1550822.0	538635.3	2.6	15.64	13.0			200	200	0.3	-5.0
1550819.3	538524.0	3.8	15.64	11.8			311	300	-11.0	-7.7
1550811.9	538422.6	3.9	15.64	11.7			412	400	-12.4	-15.1
1550814.6	538324.3	4.4	15.64	11.2	7.3	8.3	511	500	-10.7	-12.4
1550828.4	538228.3	3.8	15.64	11.8			607	600	-6.7	1.4
1550841.8	538120.0	3.8	15.64	11.8			715	700	-15.0	14.8
1550837.0	538027.4	4.0	15.64	11.6			808	800	-7.6	10.0
1550825.1	537931.7	3.7	15.64	11.9			903	900	-3.3	-1.9
1550814.9	537842.9	1.7	15.64	13.9	5.0	10.6	992	1000	7.9	-12.1
1550834.8	537734.7	0.8	15.64	14.8			1100	1100	-0.3	7.8
								AVG	-9.7	-1.9
								STD	12.5	8.9

LINE 133_50

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1550341.6	538788.7	1.2	15.64	14.4	5.6	10.0	66	0	-66.3	4.6
1550345.3	538742.7	2.5	15.64	13.1			112	100	-12.3	8.3
1550336.4	538654.1	3.1	15.64	12.5			201	200	-0.9	-0.6
1550333.5	538539.5	3.9	15.64	11.7			316	300	-15.5	-3.5
1550331.6	538443.6	4.0	15.64	11.6			411	400	-11.4	-5.4
1550333.3	538349.7	4.2	15.64	11.4	7.5	8.1	505	500	-5.3	-3.7
1550336.9	538254.0	3.5	15.64	12.1			601	600	-1.0	-0.1
1550341.6	538153.5	2.8	15.64	12.8			702	700	-1.5	4.6
1550349.2	538048.7	2.2	15.64	13.4			806	800	-6.3	12.2
1550343.9	537963.7	2.0	15.64	13.6	5.8	9.8	891	900	8.7	6.9
								AVG	-11.2	2.3
								STD	19.5	5.6

FOX LAKE

LINE 136_70

Norhting	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1550062.1	542295.7	1.6	15.7	14.1	5.7	10.0	219	200	-19.3	5.1
1550031.5	542220.8	2.6	15.7	13.1			294	300	5.8	-25.5
1550062.8	542120.9	2.4	15.7	13.3			394	400	5.9	5.8
1550076.5	542015.0	2.6	15.7	13.1	5.6	10.1	500	500	0.0	19.5
1550031.3	541916.3	2.1	15.7	13.6			599	600	1.3	-25.7
1550037.2	541814.3	2.7	15.7	13.0			701	700	-0.7	-19.8
1550026.7	541714.4	2.7	15.7	13.0			801	800	-0.6	-30.3
1550019.7	541611.8	4.6	15.7	11.1			903	900	-3.2	-37.3
1550012.9	541520.8	2.7	15.7	13.0	4.0	11.7	994	1000	5.8	-44.1
1550018.6	541426.0	2.1	15.7	13.6			1089	1100	11.0	-38.4
1550060.0	541346.1	2.3	15.7	13.4	4.4	11.3	1169	1200	31.1	3.0
								AVG	3.4	-17.1
								STD	11.5	20.6

LINE 141_60

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1549547.9	542771.1	1.8	15.7	13.9	6.0	9.7	64	0	-63.9	-19.1
1549552.7	542733.5	2.1	15.7	13.6			102	100	-1.5	-14.3
1549569.8	542633.7	3.0	15.7	12.7			201	200	-1.3	2.8
1549584.8	542535.6	2.8	15.7	12.9			299	300	0.6	17.8
1549559.1	542434.0	3.4	15.7	12.3			401	400	-1.0	-7.9
1549563.3	542330.3	2.6	15.7	13.1	7.3	8.4	505	500	-4.7	-3.7
1549582.1	542239.2	3.0	15.7	12.7			596	600	4.2	15.1
1549575.8	542131.8	2.9	15.7	12.8			703	700	-3.2	8.8
1549570.5	542033.2	3.4	15.7	12.3			802	800	-1.8	3.5
1549560.7	541939.9	3.1	15.7	12.6			895	900	4.9	-6.3
1549564.8	541827.3	2.7	15.7	13.0	6.9	8.8	1008	1000	-7.7	-2.2
1549565.6	541738.6	1.1	15.7	14.6	2.0	13.7	1096	1100	3.6	-1.4
								AVG	-6.0	-0.6
								STD	17.8	10.5

LINE 147_60

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn	Ideal Stn.	Diff.	Off Line
1548946.9	542674.7	1.8	15.7	13.9	4.5	11.2	60	0	-60.3	-20.1
1548966.8	542640.0	2.5	15.7	13.2			95	100	5.0	-0.2
1549018.0	542530.4	2.7	15.7	13.0			205	200	-4.6	51.0
1549007.3	542434.3	2.9	15.7	12.8			301	300	-0.7	40.3
1548996.0	542330.7	3.2	15.7	12.5			404	400	-4.3	29.0
1548975.0	542239.5	3.3	15.7	12.4	10.0	5.7	496	500	4.5	8.0
1548965.9	542135.5	3.1	15.7	12.6			600	600	0.5	-1.1
1548960.0	542025.4	2.6	15.7	13.1			710	700	-9.6	-7.0
1548977.6	541966.0	1.8	15.7	13.9	4.2	11.5	769	800	31.0	10.6
								AVG	-4.3	12.3
								STD	22.6	22.0

LINE 153_50

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1548371.2	541805.2	1.3	15.66	14.4	2.5	13.2	90	100	9.8	-5.8
1548372.9	541919.6	3.0	15.66	12.7			205	200	-4.6	-4.1
1548383.9	542008.0	3.9	15.66	11.8			293	300	7.0	6.9
1548384.8	542135.0	3.7	15.66	12.0			420	400	-20.0	7.8
1548387.6	542230.1	3.3	15.66	12.4	6.7	9.0	515	500	-15.1	10.6
1548387.3	542322.6	3.3	15.66	12.4			608	600	-7.6	10.3
1548379.6	542417.7	3.6	15.66	12.1			703	700	-2.7	2.6
1548372.7	542510.8	3.4	15.66	12.3			796	800	4.2	-4.3
1548372.1	542615.5	3.2	15.66	12.5			901	900	-0.5	-4.9
1548371.1	542727.3	3.5	15.66	12.2	4.2	11.5	1012	1000	-12.3	-5.9
1548368.7	542819.7	2.7	15.66	13.0			1105	1100	-4.7	-8.3
1548366.7	542915.6	2.8	15.66	12.9			1201	1200	-0.6	-10.3
1548364.8	543013.7	2.8	15.66	12.9			1299	1300	1.3	-12.2
1548362.7	543113.2	3.3	15.66	12.4			1398	1400	1.8	-14.3
1548360.8	543208.0	2.8	15.66	12.9	7.5	8.2	1493	1500	7.0	-16.2
1548358.6	543313.2	2.7	15.66	13.0			1598	1600	1.8	-18.4
1548356.6	543408.3	2.7	15.66	13.0			1693	1700	6.7	-20.4
1548354.5	543511.9	2.0	15.66	13.7			1797	1800	3.1	-22.5
1548352.3	543617.3	2.2	15.66	13.5			1902	1900	-2.3	-24.7
1548350.4	543716.3	1.8	15.66	13.9	10.0	5.7	2001	2000	-1.3	-26.6
								AVG	-1.4	-8.0
								STD	7.5	11.3

LINE 156_60

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1548079.4	543118.4	2.2	15.66	13.5	5.8	9.9	57	0	-56.6	12.4
1548074.7	543076.1	3.1	15.66	12.6			99	100	1.1	7.7
1548076.9	542972.3	3.4	15.66	12.3			203	200	-2.7	9.9
1548071.1	542875.1	2.8	15.66	12.9			300	300	0.1	4.1
1548076.8	542785.9	3.4	15.66	12.3			389	400	10.9	9.8
1548059.3	542672.1	3.5	15.66	12.2	10.9	4.8	503	500	-2.9	-7.7
1548064.1	542571.1	3.3	15.66	12.4			604	600	-3.9	-2.9
1548056.9	542465.8	3.4	15.66	12.3			709	700	-9.2	-10.1
1548060.9	542382.6	3.7	15.66	12.0			792	800	7.6	-6.1
1548068.1	542275.5	3.4	15.66	12.3			900	900	0.5	1.1
1548070.6	542175.6	4.0	15.66	11.7	12.0	3.7	999	1000	0.6	3.6
1548069.0	542070.6	3.3	15.66	12.4			1104	1100	-4.4	2.0
1548074.0	541974.0	3.3	15.66	12.4			1201	1200	-1.0	7.0
1548063.8	541876.2	2.7	15.66	13.0			1299	1300	1.2	-3.2
1548063.8	541775.8	1.6	15.66	14.1			1399	1400	0.8	-3.2
1548058.2	541751.1	1.1	15.66	14.6	4.0	11.7	1424	1500	76.1	-8.8
								AVG	1.1	1.0
								STD	24.1	7.0

LINE 161_50

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1547556.0	543564.9	1.8	15.66	13.9	3.0	12.7	70	0	-70.1	-21.0
1547553.7	543538.1	2.2	15.66	13.5			97	100	3.1	-23.3
1547586.5	543438.3	2.5	15.66	13.2			197	200	3.3	9.5
1547571.5	543331.6	2.3	15.66	13.4			303	300	-3.4	-5.5
1547566.5	543233.8	3.2	15.66	12.5			401	400	-1.2	-10.5
1547566.4	543140.8	3.1	15.66	12.6	10.5	5.2	494	500	5.8	-10.6
1547588.8	543032.1	2.7	15.66	13.0			603	600	-2.9	11.8
1547591.5	542930.1	2.9	15.66	12.8			705	700	-4.9	14.5
1547593.3	542839.3	2.1	15.66	13.6			796	800	4.3	16.3
1547594.4	542732.5	3.4	15.66	12.3			903	900	-2.5	17.4
1547589.0	542637.9	2.8	15.66	12.9	13.0	2.7	997	1000	2.9	12.0
1547585.6	542531.2	4.0	15.66	11.7			1104	1100	-3.8	8.6
1547579.3	542421.5	3.5	15.66	12.2			1214	1200	-13.5	2.3
1547577.8	542334.1	3.4	15.66	12.3			1301	1300	-0.9	0.8
1547571.6	542237.2	3.1	15.66	12.6			1398	1400	2.2	-5.4
1547558.3	542133.4	3.5	15.66	12.2	6.5	9.2	1502	1500	-1.6	-18.7
1547563.2	542034.5	3.3	15.66	12.4			1601	1600	-0.5	-13.8
1547575.7	541935.0	2.6	15.66	13.1			1700	1700	0.0	-1.3
1547584.1	541825.9	1.9	15.66	13.8			1809	1800	-9.1	7.1
1547581.1	541782.7	1.8	15.66	13.9	3.5	12.2	1852	1900	47.7	4.1
								AVG	-2.3	-0.3
								STD	19.4	12.5

LINE 161_51

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1547584.1	540628.3	1.7	15.65	14.0	4.1	11.6	107	100	-6.7	7.1
1547539.0	540530.8	2.2	15.65	13.5			204	200	-4.2	-38.0
1547517.9	540431.7	2.0	15.65	13.7			303	300	-3.3	-59.1
1547560.7	540337.1	2.4	15.65	13.3			398	400	2.1	-16.3
1547628.3	540231.7	3.2	15.65	12.5	9.4	6.3	503	500	-3.3	51.3
1547631.6	540124.8	2.4	15.65	13.3			610	600	-10.2	54.6
1547571.7	540034.0	2.4	15.65	13.3			701	700	-1.0	-5.3
1547521.8	539932.4	3.2	15.65	12.5			803	800	-2.6	-55.2
1547535.0	539835.7	3.0	15.65	12.7			899	900	0.7	-42.0
1547581.8	539726.3	2.2	15.65	13.5	6.4	9.3	1009	1000	-8.7	4.8
1547578.6	539681.3	1.3	15.65	14.4			1054	1100	46.3	1.6
								AVG	0.8	-8.8
								STD	14.8	36.8

LINE 166_50

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1547075.9	539910.7	1.6	15.66	14.1			-94	-100	-5.7	-1.1
1547081.5	540004.7	2.6	15.66	13.1	3.5	12.2	0	0	0.3	4.5
1547085.3	540102.6	2.6	15.66	13.1			98	100	2.4	8.3
1547090.5	540200.8	3.2	15.66	12.5			196	200	4.2	13.5
1547090.8	540304.0	3.3	15.66	12.4			299	300	1.0	13.8
1547075.7	540412.8	3.4	15.66	12.3			408	400	-7.8	-1.3
1547076.4	540510.9	3.6	15.66	12.1	12.0	3.7	506	500	-5.9	-0.6
1547071.2	540614.6	3.3	15.66	12.4			610	600	-9.6	-5.8
1547064.6	540701.0	3.1	15.66	12.6			696	700	4.0	-12.4
1547057.1	540807.5	3.2	15.66	12.5			803	800	-2.5	-19.9
1547055.0	540913.3	2.6	15.66	13.1			908	900	-8.3	-22.0
1547057.7	541016.5	3.0	15.66	12.7	4.5	11.2	1012	1000	-11.5	-19.3
1547058.5	541104.7	1.4	15.66	14.3			1100	1100	0.3	-18.5
1547045.6	541203.2	2.1	15.66	13.6			1198	1200	1.8	-31.4
1547045.3	541306.4	2.2	15.66	13.5			1301	1300	-1.4	-31.7
1547038.6	541403.7	2.0	15.66	13.7			1399	1400	1.3	-38.4
1547043.1	541501.0	1.4	15.66	14.3	2.5	13.2	1496	1500	4.0	-33.9
1547067.1	541603.4	2.7	15.66	13.0			1598	1600	1.6	-9.9
1547075.6	541715.0	3.9	15.66	11.8			1710	1700	-10.0	-1.4
1547082.1	541809.6	3.0	15.66	12.7			1805	1800	-4.6	5.1
1547091.2	541907.4	2.9	15.66	12.8			1902	1900	-2.4	14.2
1547101.9	542007.6	3.0	15.66	12.7	5.5	10.2	2003	2000	-2.6	24.9
1547104.2	542108.5	2.3	15.66	13.4			2104	2100	-3.5	27.2
1547098.2	542208.5	2.2	15.66	13.5			2204	2200	-3.5	21.2
1547084.7	542312.1	2.1	15.66	13.6			2307	2300	-7.1	7.7
1547086.9	542414.5	2.8	15.66	12.9			2410	2400	-9.5	9.9
1547084.6	542513.6	3.0	15.66	12.7	4.5	11.2	2509	2500	-8.6	7.6
1547082.3	542612.0	2.7	15.66	13.0			2607	2600	-7.0	5.3
1547080.2	542707.8	2.6	15.66	13.1			2703	2700	-2.8	3.2
1547077.7	542818.4	2.7	15.66	13.0			2813	2800	-13.4	0.7
1547076.0	542896.1	2.5	15.66	13.2	4.5	11.2	2891	2900	8.9	-1.0
								AVG	-3.2	-2.6
								STD	5.3	17.1

LINE 171_50

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1546572.4	541748.7	1.3	15.65	14.4	3.6	12.1	26	0	-26.3	-4.6
1546572.7	541672.9	1.9	15.65	13.8			102	100	-2.1	-4.3
1546579.0	541572.5	2.5	15.65	13.2			203	200	-2.5	2.0
1546579.2	541468.7	2.9	15.65	12.8			306	300	-6.3	2.2
1546585.5	541370.7	2.6	15.65	13.1			404	400	-4.3	8.5
1546582.2	541266.5	2.6	15.65	13.1	6.0	9.7	509	500	-8.5	5.2
1546590.4	541161.6	6.5	15.65	9.2			613	600	-13.4	13.4
1546586.3	541062.8	1.1	15.65	14.6			712	700	-12.2	9.3
1546579.9	541025.5	0.2	15.65	15.5	4.5	11.2	750	800	50.5	2.9
								AVG	-2.8	3.8
								STD	20.1	5.7

LINE 176_50

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1546095.4	541891.3	1.3	15.65	14.4	3.8	11.9	24	0	-23.7	18.4
1546068.6	541814.3	1.8	15.65	13.9			101	100	-0.7	-8.4
1546068.1	541713.6	2.1	15.65	13.6			201	200	-1.4	-8.9
1546058.1	541614.4	2.2	15.65	13.5			301	300	-0.6	-18.9
1546059.2	541505.2	2.0	15.65	13.7	4.7	11.0	410	400	-9.8	-17.8
1546070.8	541406.7	2.2	15.65	13.5			508	500	-8.3	-6.2
1546081.6	541310.2	2.3	15.65	13.4			605	600	-4.8	4.6
1546076.1	541274.2	1.2	15.65	14.5	4.1	11.6	641	700	59.2	-0.9
								AVG	1.2	-4.8
								STD	23.0	11.4

LINE 180_00

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1545657.3	541955.9	3.6	15.65	12.1	5.4	10.3	-1	0	0.9	-69.7
1545641.2	541850.1	4.0	15.65	11.7			105	100	-4.9	-85.8
1545655.4	541750.1	5.8	15.65	9.9			205	200	-4.9	-71.6
1545657.9	541652.9	4.8	15.65	10.9			302	300	-2.1	-69.1
1545652.9	541549.1	5.8	15.65	9.9			406	400	-5.9	-74.1
1545653.7	541449.8	5.2	15.65	10.5	10.0	5.7	505	500	-5.2	-73.3
1545641.2	541348.7	4.8	15.65	10.9			606	600	-6.3	-85.8
1545638.5	541248.5	5.4	15.65	10.3			707	700	-6.5	-88.5
1545645.6	541158.6	5.8	15.65	9.9			796	800	3.6	-81.4
1545646.1	541055.0	2.8	15.65	12.9	11.5	4.2	900	900	0.0	-80.9
								AVG	-3.1	-78.0
								STD	3.3	6.9

LINE H_1

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1554691.9	539630.6	3.6	15.65	12.1	7.4	8.3	-115	-100	15.1	15.6
1554805.5	539606.1	3.8	15.65	11.9			-2	0	1.5	-8.9
1554910.3	539583.2	3.4	15.65	12.3			103	100	-3.3	-31.8
1555009.4	539561.6	1.4	15.65	14.3			202	200	-2.4	-53.4
1555110.9	539539.4	1.2	15.65	14.5	4.5	11.2	304	300	-3.9	-75.6
								AVG	1.4	-30.8
								STD	7.1	32.1

LINE H_3

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1552681.5	538877.8	2.0	15.65	13.7	7.6	8.1	-155	-200	-45.5	12.8
1552621.6	538880.2	3.8	15.65	11.9			-95	-100	-5.4	15.2
1552515.9	538887.4	4.2	15.65	11.5			11	0	-11.1	22.4
1552421.8	538888.6	3.2	15.65	12.5			105	100	-5.2	23.6
1552321.2	538900.6	4.2	15.65	11.5			206	200	-5.8	35.6
1552215.3	538888.3	3.6	15.65	12.1	10.0	5.7	312	300	-11.7	23.3
1552123.0	538873.5	4.0	15.65	11.7			404	400	-4.0	8.5
1552024.2	538903.4	4.2	15.65	11.5			503	500	-2.8	38.4
1551922.1	538868.8	3.0	15.65	12.7	6.1	9.6	605	600	-4.9	3.8
								AVG	-10.7	20.4
								STD	12.6	11.0

LINE H_5

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1549694.6	538515.3	1.5	15.64	14.1	4.6	11.0	38	0	-37.6	0.3
1549764.3	538505.6	2.8	15.64	12.8			107	100	-7.3	-9.4
1549873.7	538526.9	3.3	15.64	12.3			217	200	-16.7	11.9
1549964.3	538472.6	3.8	15.64	11.8			307	300	-7.3	-42.4
1550067.4	538487.9	3.8	15.64	11.8			410	400	-10.4	-27.1
1550161.9	538516.4	3.9	15.64	11.7	7.3	8.3	505	500	-4.9	1.4
1550262.4	538493.2	4.1	15.64	11.5			605	600	-5.4	-21.8
1550367.6	538475.6	4.0	15.64	11.6			711	700	-10.6	-39.4
1550469.2	538517.4	3.2	15.64	12.4			812	800	-12.2	2.4
1550560.0	538522.1	3.1	15.64	12.5			903	900	-3.0	7.1
1550592.9	538512.8	2.8	15.64	12.8	7.4	8.2	936	1000	64.1	-2.2
								AVG	-4.7	-10.8
								STD	23.5	18.0

LINE H_6

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1552727.6	541581.2	3.5	15.7	12.2	7.0	8.7	-1	0	0.6	-8.8
1552620.1	541571.0	3.4	15.7	12.3			107	100	-6.9	-19.0
1552520.6	541573.0	3.4	15.7	12.3			206	200	-6.4	-17.0
1552428.9	541571.1	7.0	15.7	8.7			298	300	1.9	-18.9
1552325.8	541570.4	7.1	15.7	8.6			401	400	-1.2	-19.6
1552227.7	541566.8	7.2	15.7	8.5	8.5	7.2	499	500	0.7	-23.2
1552119.1	541567.3	7.2	15.7	8.5			608	600	-7.9	-22.7
1552022.5	541567.8	7.0	15.7	8.7			705	700	-4.5	-22.2
1551928.0	541569.3	7.4	15.7	8.3			799	800	1.0	-20.7
1551823.5	541570.2	7.1	15.7	8.6			904	900	-3.5	-19.8
1551731.3	541566.2	7.0	15.7	8.7	9.5	6.2	996	1000	4.3	-23.8
1551621.6	541565.7	6.9	15.7	8.8			1105	1100	-5.4	-24.3
1551526.6	541567.9	6.9	15.7	8.8			1200	1200	-0.4	-22.1
1551432.5	541567.5	6.5	15.7	9.2			1295	1300	5.5	-22.5
1551327.1	541569.1	7.0	15.7	8.7			1400	1400	0.1	-20.9
1551232.8	541566.8	6.8	15.7	8.9	9.4	6.3	1494	1500	5.8	-23.2
1551116.5	541564.0	7.2	15.7	8.5			1611	1600	-10.5	-26.0
1551024.0	541561.2	6.5	15.7	9.2			1703	1700	-3.0	-28.8
1550922.2	541556.3	5.1	15.7	10.6			1805	1800	-4.8	-33.7
1550824.3	541555.0	4.4	15.7	11.3			1903	1900	-2.7	-35.0
1550710.7	541554.6	3.2	15.7	12.5	4.2	11.5	2016	2000	-16.3	-35.4
1550635.5	541555.0	6.0	15.7	9.7			2092	2100	8.5	-35.0
1550531.4	541560.9	6.1	15.7	9.6			2196	2200	4.4	-29.1
1550423.5	541564.8	6.0	15.7	9.7			2304	2300	-3.5	-25.2
1550338.9	541567.4	5.8	15.7	9.9			2388	2400	11.9	-22.6
1550225.5	541572.3	6.4	15.7	9.3	9.0	6.7	2502	2500	-1.5	-17.7
1550126.6	541594.8	6.0	15.7	9.7			2600	2600	-0.4	4.8
1550020.7	541609.9	3.1	15.7	12.6			2706	2700	-6.3	19.9
1549936.0	541599.2	3.4	15.7	12.3			2791	2800	9.0	9.2
1549840.4	541628.9	3.3	15.7	12.4			2887	2900	13.4	38.9
1549725.7	541609.6	1.9	15.7	13.8	5.0	10.7	3001	3000	-1.3	19.6
1549695.4	541603.4	1.7	15.7	14.0	4.5	11.2	3032	3100	68.4	13.4
								AVG	1.5	-16.0
								STD	13.5	17.7

LINE H_8

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1547886.6	540081.1	1.8	15.65	13.9	4.5	11.2	190	190	-0.4	6.1
1547858.7	540083.3	2.2	15.65	13.5			218	200	-18.3	8.3
1547771.0	540083.7	2.8	15.65	12.9			306	300	-6.0	8.7
1547673.1	540075.9	2.4	15.65	13.3			404	400	-3.9	0.9
1547570.6	540086.1	3.2	15.65	12.5	8.4	7.3	506	500	-6.4	11.1
1547470.8	540073.1	2.8	15.65	12.9			606	600	-6.2	-1.9
1547371.7	540070.3	2.9	15.65	12.8			705	700	-5.3	-4.7
1547269.3	540069.9	2.9	15.65	12.8	6.0	9.7	808	800	-7.7	-5.1
								AVG	-6.8	2.9
								STD	4.8	6.0

LINE H_9

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Bottom	Hard El.	Actual El.	Ideal El.	Diff.	Off Line
1546576.3	541138.9	5.1	15.65	10.6	6.5	9.2	1	0	-0.7	3.9
1546474.7	541150.7	2.6	15.65	13.1			102	100	-2.3	15.7
1546372.3	541145.0	2.6	15.65	13.1			205	200	-4.7	10.0
1546276.3	541145.6	4.8	15.65	10.9			301	300	-0.7	10.6
1546178.1	541149.3	7.2	15.65	8.5			399	400	1.1	14.3
1546076.6	541150.7	6.2	15.65	9.5	8.7	7.0	500	500	-0.4	15.7
1545969.0	541149.4	5.2	15.65	10.5			608	600	-8.0	14.4
1545873.9	541155.0	6.0	15.65	9.7			703	700	-3.1	20.0
1545770.9	541148.3	6.4	15.65	9.3			806	800	-6.1	13.3
1545671.5	541129.4	2.8	15.65	12.9	7.8	7.9	906	900	-5.5	-5.6
								AVG	-3.0	11.2
								STD	2.8	6.9

LINE S_1

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1547562.1	543163.4	2.6	15.65	13.1	7.4	8.3	-24	0	23.8	13.5
1547623.7	543282.4	3.0	15.65	12.7			108	100	-7.5	-3.8
1547688.4	543351.1	2.2	15.65	13.5			183	200	16.7	-23.9
1547730.4	543450.4	3.4	15.65	12.3			293	300	7.1	-23.5
1547763.1	543553.5	2.4	15.65	13.3			407	400	-6.7	-14.6
1547815.1	543630.1	2.0	15.65	13.7	5.1	10.6	491	500	8.7	-23.2
1547862.0	543702.4	2.4	15.65	13.3			571	600	28.9	-27.2
1547872.3	543822.5	2.8	15.65	12.9			704	700	-3.6	2.0
1547929.8	543920.0	2.2	15.65	13.5			811	800	-11.3	-11.6
1548020.6	543984.0	2.5	15.65	13.2			882	900	18.1	-55.4
1548134.4	544099.3	1.8	15.65	13.9	4.4	11.3	1009	1000	-9.2	-120.0
1548204.6	544167.5	0.6	15.65	15.1	4.2	11.5	1084	1100	15.6	-142.8
								AVG	6.7	-35.9
								STD	13.4	46.0

LINE S_2

Northing	Easting	Water Depth	Corr.	Bottom El.	Hard Depth	Hard El.	Actual Stn.	Ideal Stn.	Diff.	Off Line
1547570.9	539830.1	2.4	15.65	13.3	7.8	7.9	8	8	0.5	0.6
1547627.9	539727.6	3.2	15.65	12.5			165	108	-57.2	-17.6
1547684.3	539647.3	3.0	15.65	12.7			289	208	-80.8	-36.2
1547748.0	539571.9	3.0	15.65	12.7			405	308	-96.8	-50.1
1547817.6	539498.9	2.6	15.65	13.1			517	408	-109.1	-60.1
1547922.3	539468.3	3.6	15.65	12.1	13.0	2.7	564	508	-56.2	-47.3
1548029.5	539441.3	3.1	15.65	12.6			606	608	2.3	-32.8
1548139.6	539413.6	2.6	15.65	13.1			648	708	59.7	-16.5
1548246.3	539386.9	2.0	15.65	13.7	10.7	5.0	689	808	118.6	0.2
								AVG	-24.3	-28.9
								STD	71.9	20.6