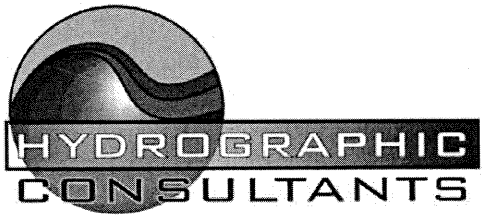

Project Report To
Texas Water Development Board

1700 North Congress Avenue
Austin, Texas 78711-3231

Single Beam Bathymetric Survey of Rio Grande River from the Brownsville El Jardin Weir to the Gulf of Mexico.

Prepared By:

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(713) 432-9909

March 5th, 2008

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1.0 Introduction

Between January 14th and March 3rd, 2008 Hydrographic Consultants, Ltd performed a Single Beam, Hydrographic Survey of the Lower Rio Grande River for the Texas Water Development Board.
The survey was performed as described in our proposal by running 2 serpentine lines at counter phase to each other, 2 wing lines and 1 centerline through each section.

2.0 Scope of Work

The survey coverage was to consist of 49 miles of river below the El Jardin weir in Brownsville to the Gulf of Mexico (figure 1). The survey area was divided into 9 separate reaches, each reach was completed before proceeding to the next
Three (3) longitudinal lines along the river and 2 sinusoidal lines were run (figure 2).
3 Onset "Hobo" water level data loggers were installed and operated at a 30 second interval for the entire duration of the survey. The "Hobo" data loggers were referenced to 6 control points established along the river with a Trimble RTK system. An additional Hobo pressure gauge was used to compensate for errors caused by barometric pressure changes.

Figure 1. Survey Area.

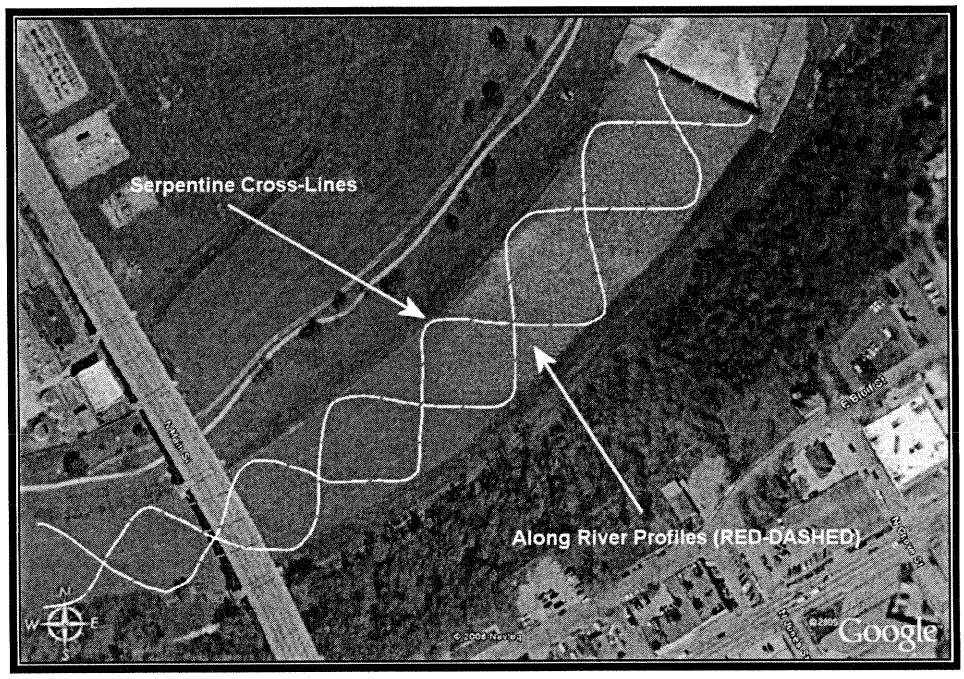


Figure 2. Typical survey line configuration used for the Rio Grande survey.

3.0 Equipment and Methodology

Because of the poor condition of the boat ramps, particularly in the upstream area, two vessels were mobilized and used for various portions of the project. The second vessel was also available as a standby vessel in case of mechanical breakdowns or other emergencies.
An Odom CVM and an Odom Hydrotrac single beam echo sounder operating at 200KHz was used to measure water depths. The CVM and Hydrotrac were calibrated at the start and end of each days survey work with a Bar Check. The horizontal position was obtained with a Trimble DSM 132 DGPS and a Trimble NT300D receiver corrected by signals from the USCG beacon at Aransas Pass. Coastal Oceanographic's "Hypack" Version 6.2 hydrographic software package was used to collect data from both the Odom Echo Sounder and the Trimble DGPS which also provided real time line guidance for the helmsman.
Prior to Single Beam data collection, six temporary control points were set using a Trimble RTK (5700 / 5800) system.
Five survey lines consisting of: 1 Center Line, 2 Wing Lines and 2 Sinusoidal "S" Lines were run.

3.1 Equipment Installation and Calibration

For the narrow, upstream area, the survey equipment was mobilized onto a 19 foot fiberglass Carolina Skiff equipped with a 60 H.P. outboard motor. The echo sounder transducer was solidly mounted on a steel pipe to the hull on the starboard side close amidships. The DGPS antenna was mounted to the same pole so that no horizontal offsets were present. An external LCD monitor was available for the helmsman to assist with line guidance. All the survey equipment was powered by a 12V Gel cell battery or a 2kw generator. In the lower, more open region of the river, the survey equipment was mobilized onto a 23 foot fiberglass enclosed cabin vessel equipped with a 115 H.P. motor and hydraulic jack plate. The echo sounder transducer is mounted inside the vessels hull in a sea-chest. The DGPS antenna was mounted on the roof directly over the transducer so that no horizontal offsets were present. A laptop computer was used to assist the helmsman with line guidance. At the start and end of each day's survey, the calibration of the echo sounder was checked by lowering a weighted plate on a calibrated wire rope beneath the echo sounder's transducer (Bar Check). Settings for draft and speed of sound in water were entered into the sounder after the first bar check and the settings verified each day. An Odom Digibar was also used to confirm the speed of sound in water.

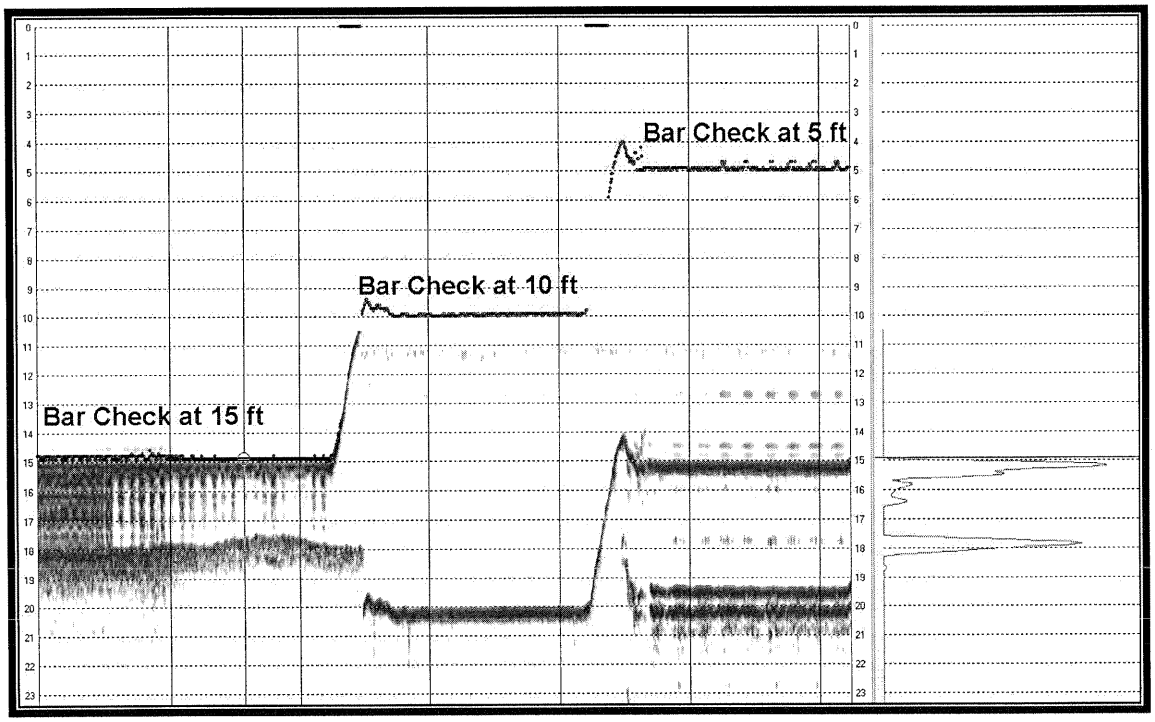


Figure 3. Electronic Echogram of a typical Bar Check used to calibrate the Echo Sounder at 5, 10 and 15 ft.

The position obtained from the DGPS receiver was compared to the temporary control point before any hydrographic data was collected to ensure no gross GPS errors.

3.2 Geodesy and Vertical Control

The survey was performed using the following geodetic and local grid parameters:

Ellipsoid	:	NAD 83 (WGS-84)
Projection	:	US State Plane
Zone	:	TX 4205 Texas South
Horizontal Units	:	US Survey Feet
Vertical Units	:	US Survey Feet

Vertical Control

A Trimble 5700 / 5800 RTK system was used to vertically reference the six tidal stations that were set along the river. The RTK base station was setup at NGS monument AB0070 (figure 4). The RTK was checked in at 2 other NGS monuments AB0058 and AB0067 (figure 5 and 6).

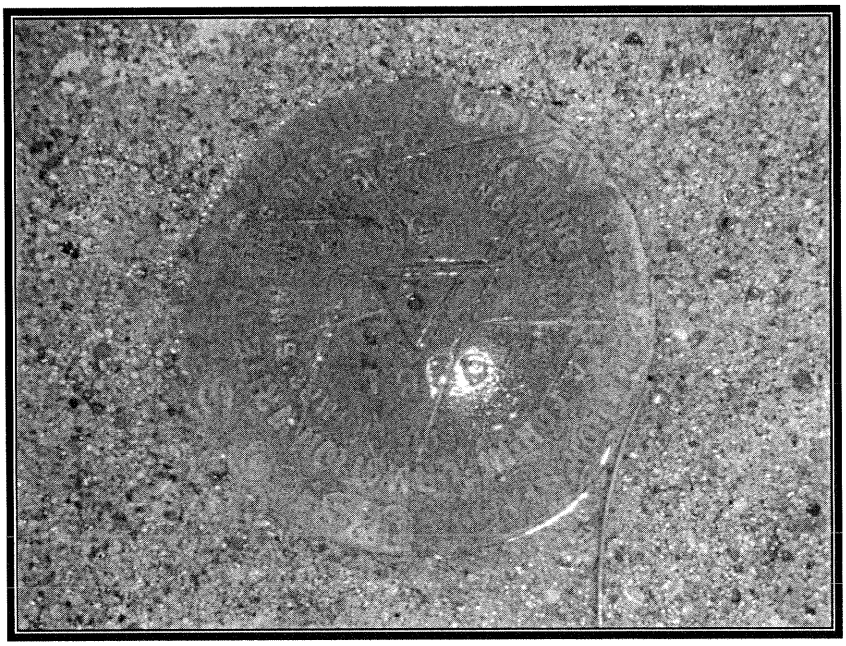


Figure 4. RTK Base Station setup on NGS monument AB0070.

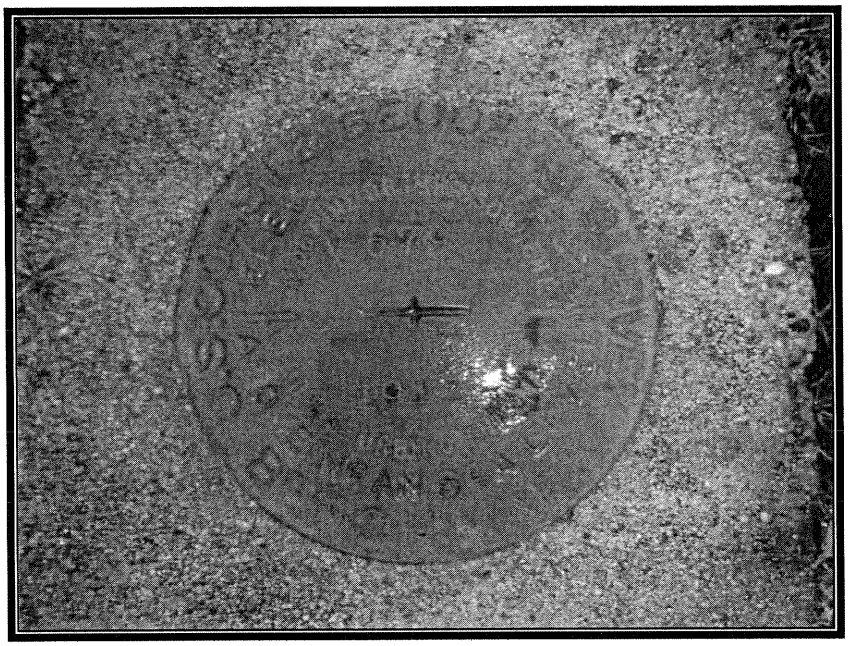


Figure 5. NGS Monument AB0058 used as check in point.

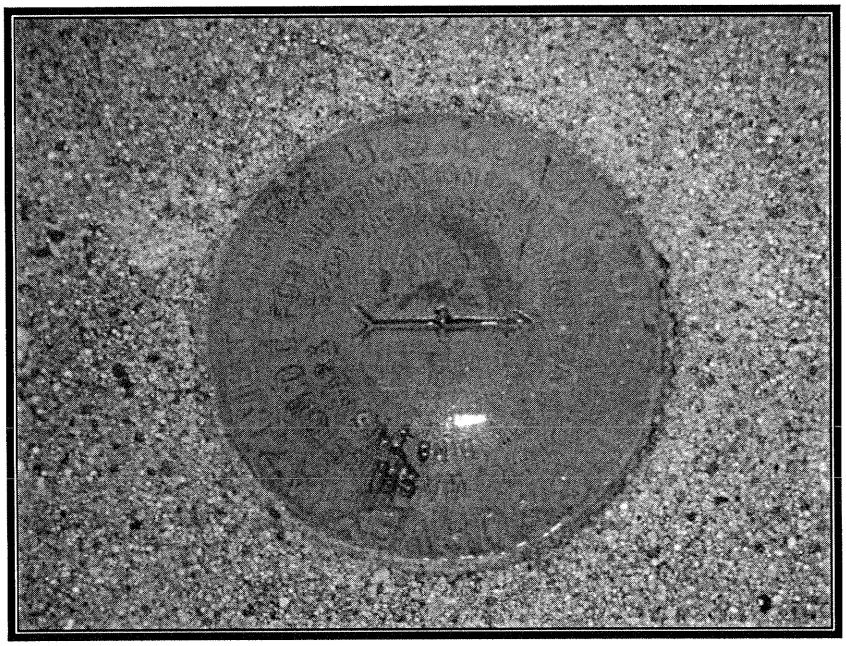


Figure 6. NGS Monument AB0067 used as check in point

Each tidal station was monumented with a 4 foot section of 3/8" rebar encased in a 4" PVC tube with 80 pounds of concrete. For accurate calibration, a conventional level was used to measure the water level each time a water level logger was launched or retrieved.
All water level loggers were configured to log data at 30 sec. intervals throughout the 11 days that the hydrographic survey was being performed.

3.3 Tides

Due to the elongated nature of the survey, it was decided to use 4 data loggers to record the water level (tide) during the survey. 3 loggers were in the water at all times relative to the sections being surveyed at the time. An additional logger was used to compensate for any errors that could be caused by barometric changes throughout the survey.
The Hobo Water Level Logger is a compact device that measures and internally logs pressure, temperature and time. The data logger is enclosed in a weighted, plastic tube that is suspended in the water column by a wire rope. Because the data logger is recording pressure and time only, a conversion must be performed to convert pounds per square inch into feet of water. Further, the scale must be shifted so that the water depth reported by the data logger is the same as the tide at any given instance. Figure 7 shows the position of each tidal station along the river.

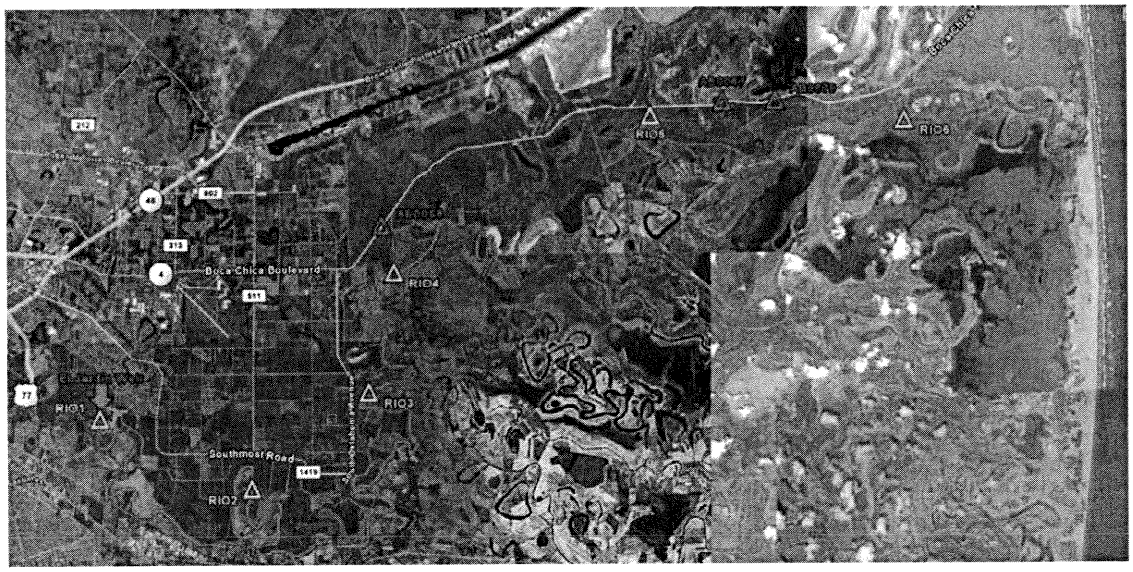


Figure 7. Showing NGS control points and relative position of the six water level logger stations located along the Lower Rio Grande Valley.

RIO1 was located just south of the El Jardin Weir (figure 8). The water level was measured when the logger was launched before surveying Section 1 and when the logger was retrieved after Sections 1 and 2 were completed.

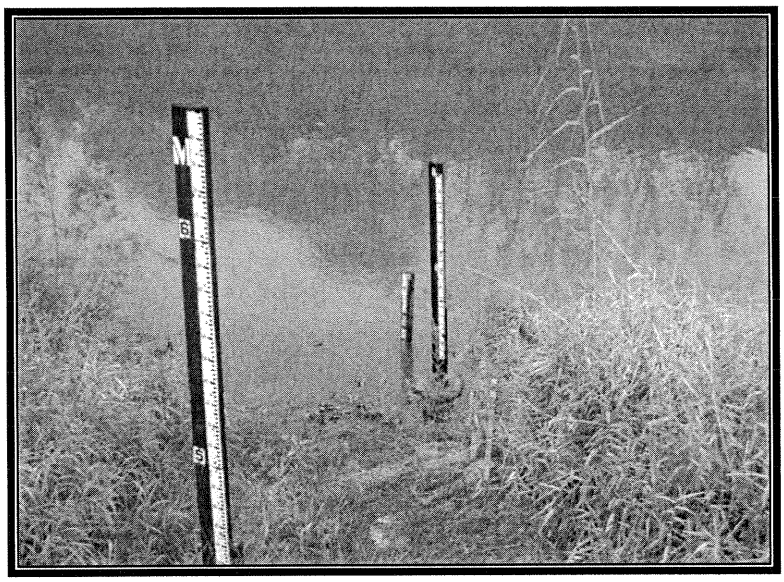


Figure 8. Showing location of the Hobo water level logger and RIO1.

RIO2 was located about 8.8 river miles downstream from RIO1 on the property owned by Dorothy Irwin (figure 9). The water level was measured when the logger was launched before surveying Section 1 and when the logger was retrieved after Sections 1-4 were completed.

Figure 9. Showing location of Hobo water level logger and RIO2.

RIO3 was located about 12.3 river miles downstream from RIO2 on the property owned by Loop Farms (figure 10). The water level was measured when the logger was launched before surveying Section 1 and when the logger was retrieved after Sections 3-5 were completed.

Figure 10. Showing location of Hobo water level logger and RIO3.

RIO4 was located about 4.5 river miles downstream from RIO3 on the property owned by Loop Farms (figure 11). The water level was measured when the logger was launched before surveying Section 5 and when the logger was retrieved after Sections 5-7 were completed.

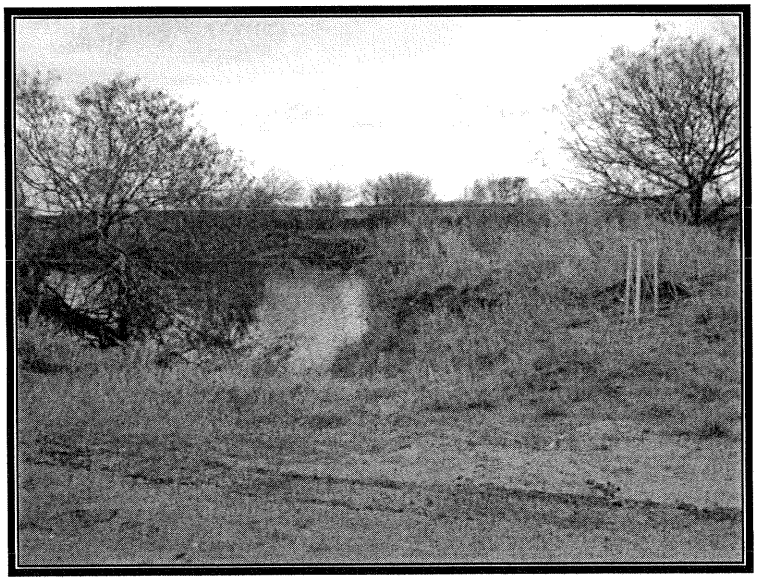


Figure 11. Showing location of Hobo water level logger and RIO4.

RIO5 was located about 12.1 river miles downstream from RIO4 on the property owned by Texas Parks and Wildlife (figure 12). The water level was measured when the logger was launched before surveying Section 5 and when the logger was retrieved after Sections 5-9 were completed.

Figure 12. Showing location of Hobo water level logger and RIO5.

RIO6 was located about 6.2 river miles downstream from RIO5 on the property owned by Texas Parks and Wildlife (figure 7). The water level was measured when the logger was launched before surveying Section 8 and when the logger was retrieved after Sections 8-9 were completed.

Figure 13. Showing location of Hobo water level logger and RIO6.

All water level loggers were configured to log data (temperature, water pressure and time) at 30 second intervals throughout the 11 days that the survey was being performed. After the survey was completed, the data loggers were downloaded and exported into a standard Excel spreadsheet format. The Hobo software allows for the inclusion of the barometric logger's data to compensate for changes in barometric pressure.

3.4 RiverTide8

A custom software package *"RiverTide8"*, was written specifically for this project, to interpolate the tide (water elevation) between each of the gauges, based on the along river distance between the gauges. Once the tide data from the gauges has been processed by RiverTide8, a seamless tide file is produced for any location at any time along the river, weighted by its position relative to the gauges and time. This tide file is then applied to the raw depth soundings to produce a tide corrected depth reduced to the NAVD88 datum.

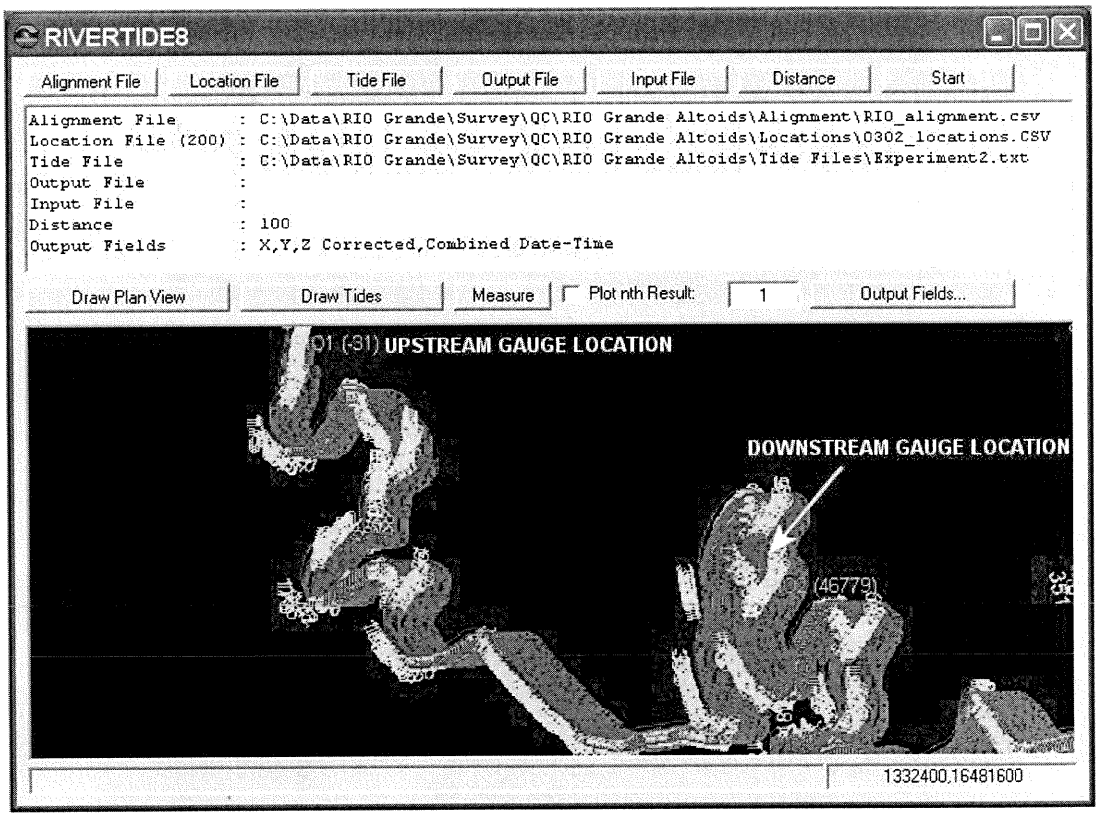


Fig. 14 Screen Capture of RiverTide8 showing two tide gauge locations. The red and blue text are azimuth and distance vectors

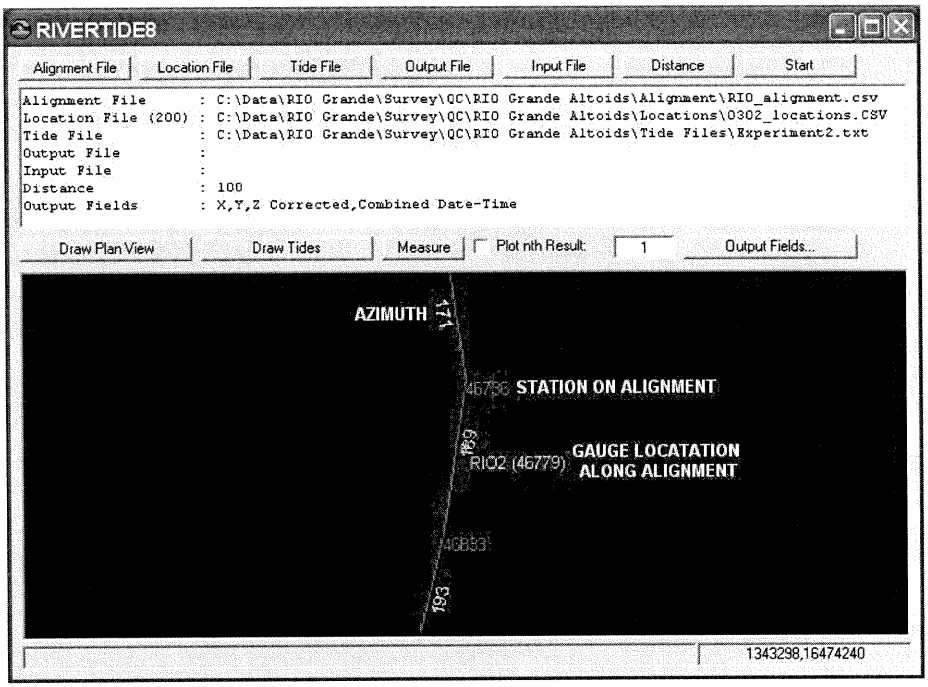


Fig 15 Zoomed in screen capture of above showing distance and azimuth vectors

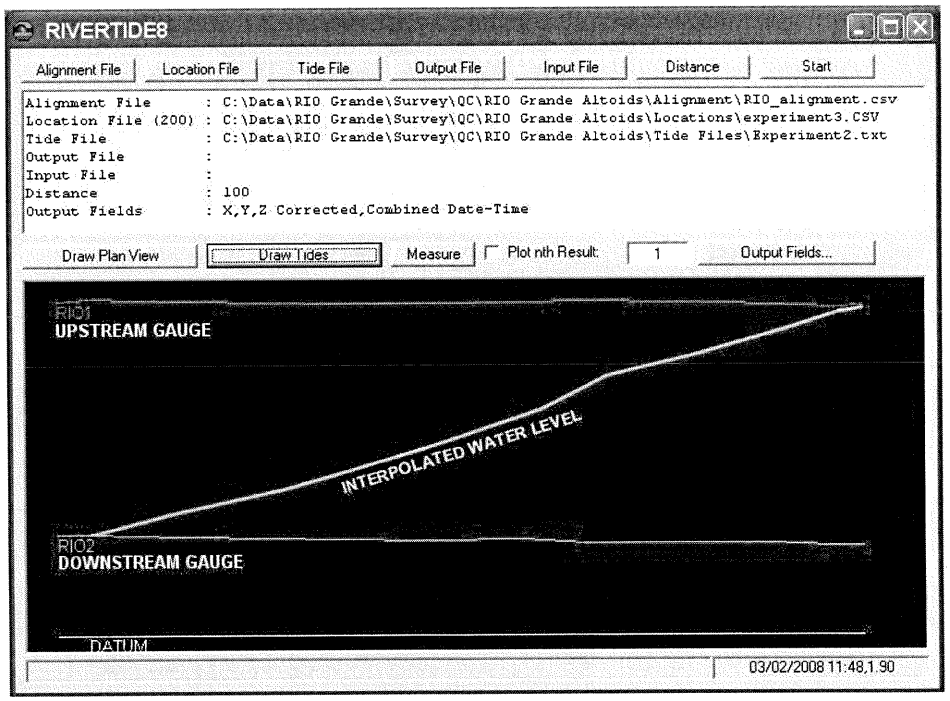


Fig. 16 A graphic representation of the interpolated water level between Gauges

All uncorrected soundings and raw tide files are included with this report for further or alternative analysis by Texas Water Development Board.

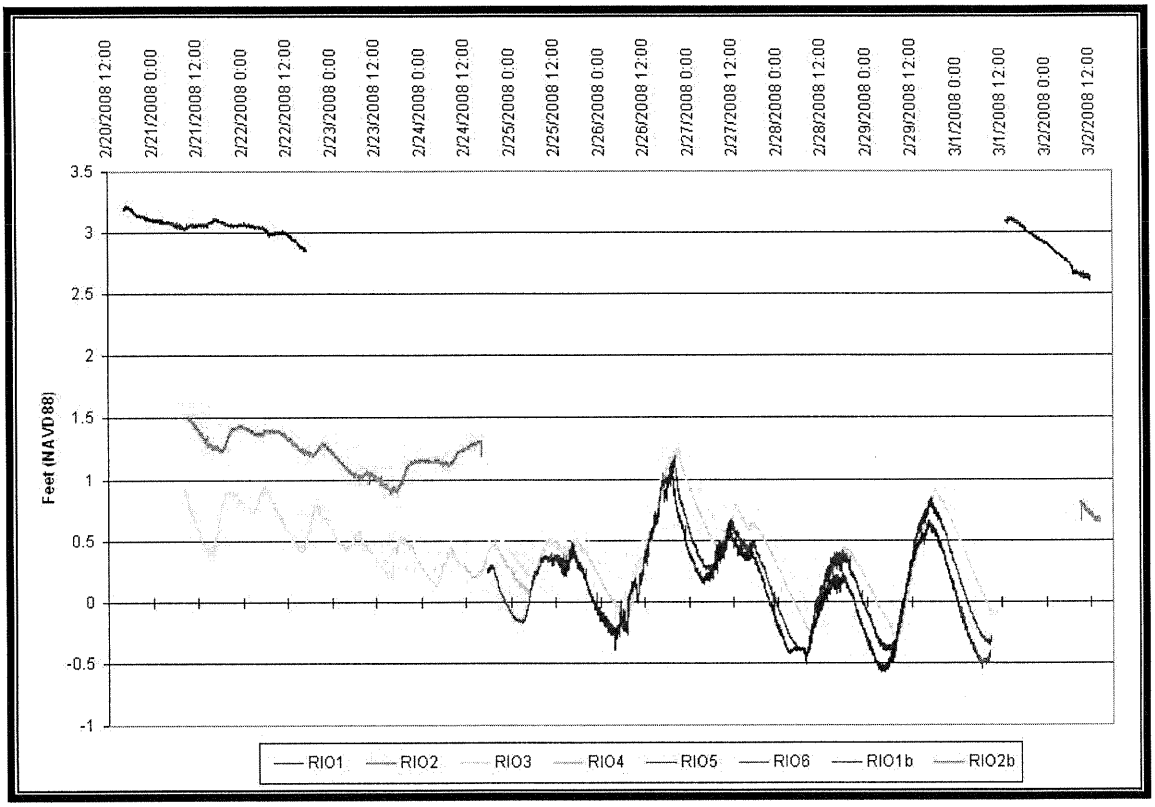


Figure 17. Tidal graph referenced to NAVD88, showing relationship of the water levels throughout the survey period.

Survey Results

4.1 Data Cleaning and Processing

The Odom CVM is a paperless echo sounder. It is connected to the Hypack data collection computer by a high speed Ethernet interface. Not only are the digital soundings sent to Hypack but also an electronic version of the actual echogram (see Figure 3). This feature is very useful for data processing in Hypack because the electronic echogram is available as a window in the single beam editor portion of Hypack (see Figure 15). It is very easy to recognize where the echo sounder has digitized on noise in the water column rather than the river bed and it is also easy to correct this during data processing. Without this feature it can be quite time consuming to check through the paper scrolls particularly in very shallow water and noisy conditions. The Hypack single beam editor utility was also used to inspect the navigation data for any jumps due to GPS or differential outages caused by overhanging vegetation (not a major problem on this survey). Once the data had been cleaned the tide file was applied and the corrected file exported as an ASCII X,Y,Z data set. An export of the same file with no tide applied was also exported. All data is available on the DVD that accompanies this report.

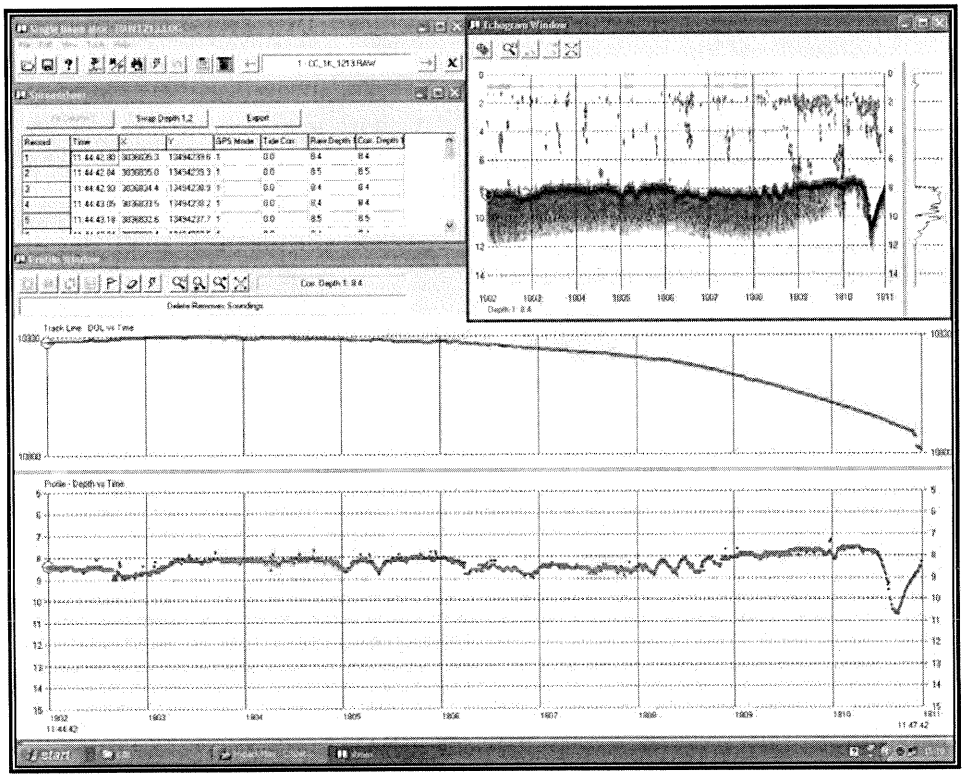


Figure 18. Typical Screen from Hypack Single Beam Editor showing Echogram (top right)Spreadsheet (top left) and plan view (bottom).

4.2 Quality Control

Before any hydrographic data was collected the DGPS antenna was placed over a control point to ensure there were no gross DGPS errors and that the correct WGS84 to US State Plane (Texas South 4205) conversion was being performed. A "bar check" was performed and logged at the start and end of each days survey activity to correct for any changes in the vessel's draft and water velocity. As a further QC check, the area of overlap between one river section and the next was compared. A cross section was cut across the junction of all sections to ensure that no depth errors had been introduced.

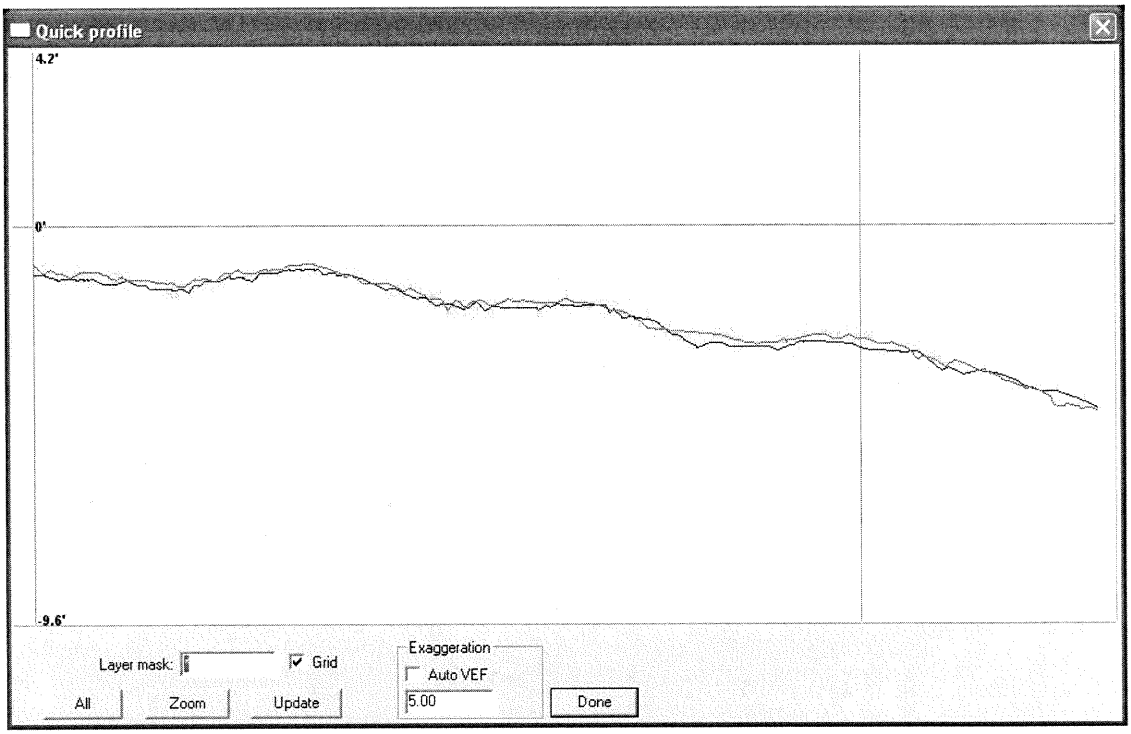


Fig. 19 River Section 1 to River Section 2 Cross Section

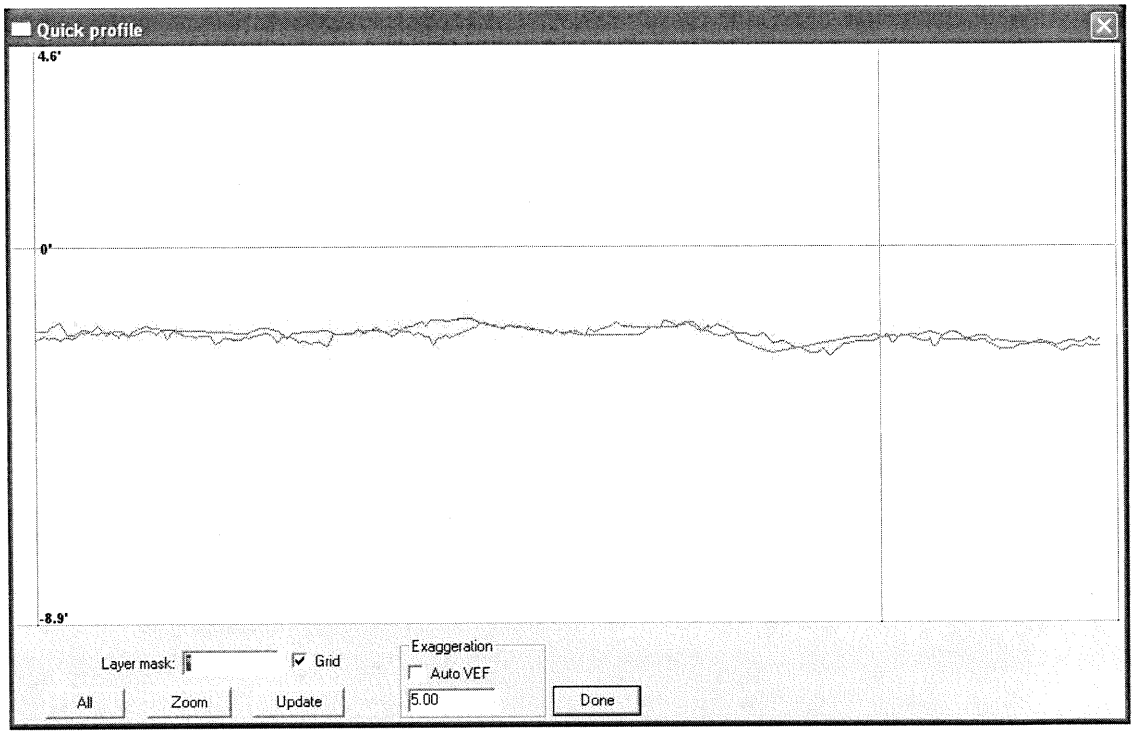


Fig. 20 River Section 2 to River Section 3 Cross Section

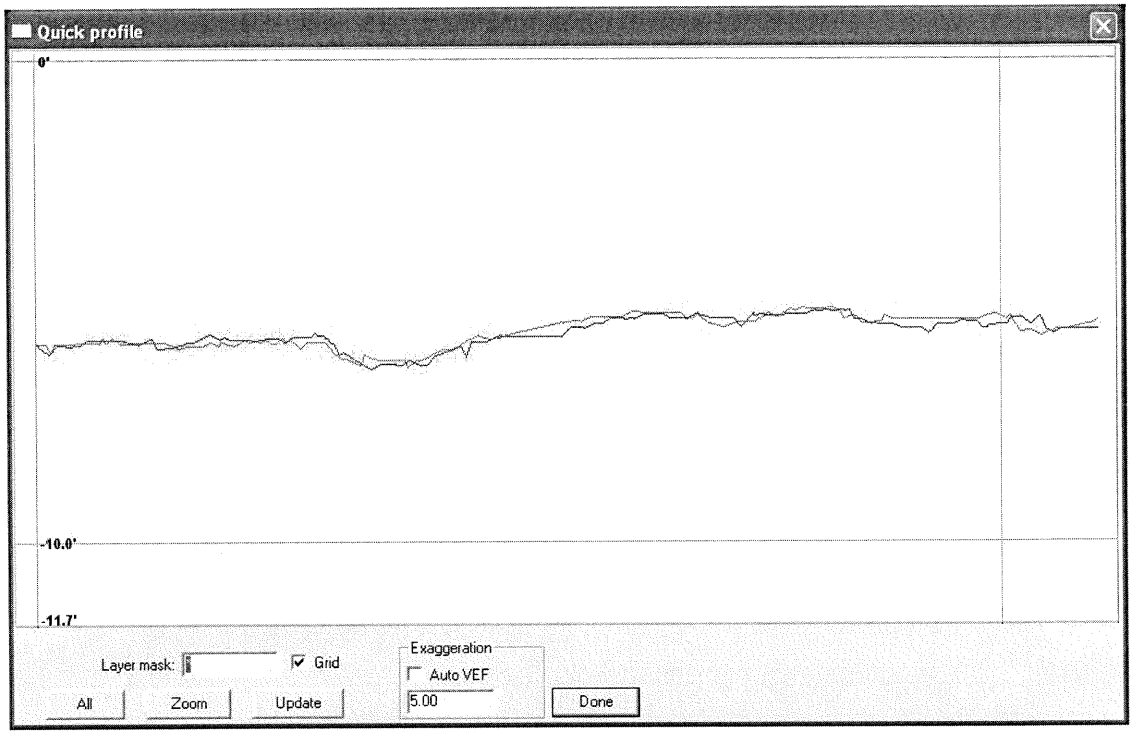


Fig. 21River Section 3 to River Section 4 Cross Section

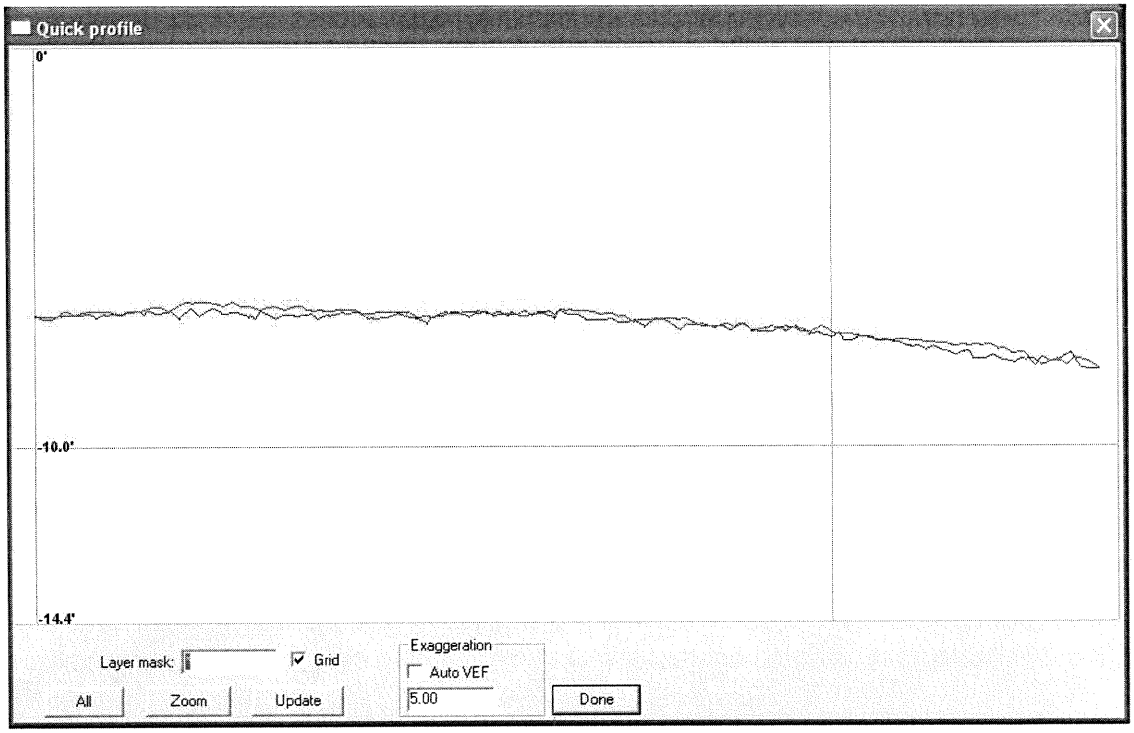


Fig. 22 River Section 4 to River Section 5 Cross Section

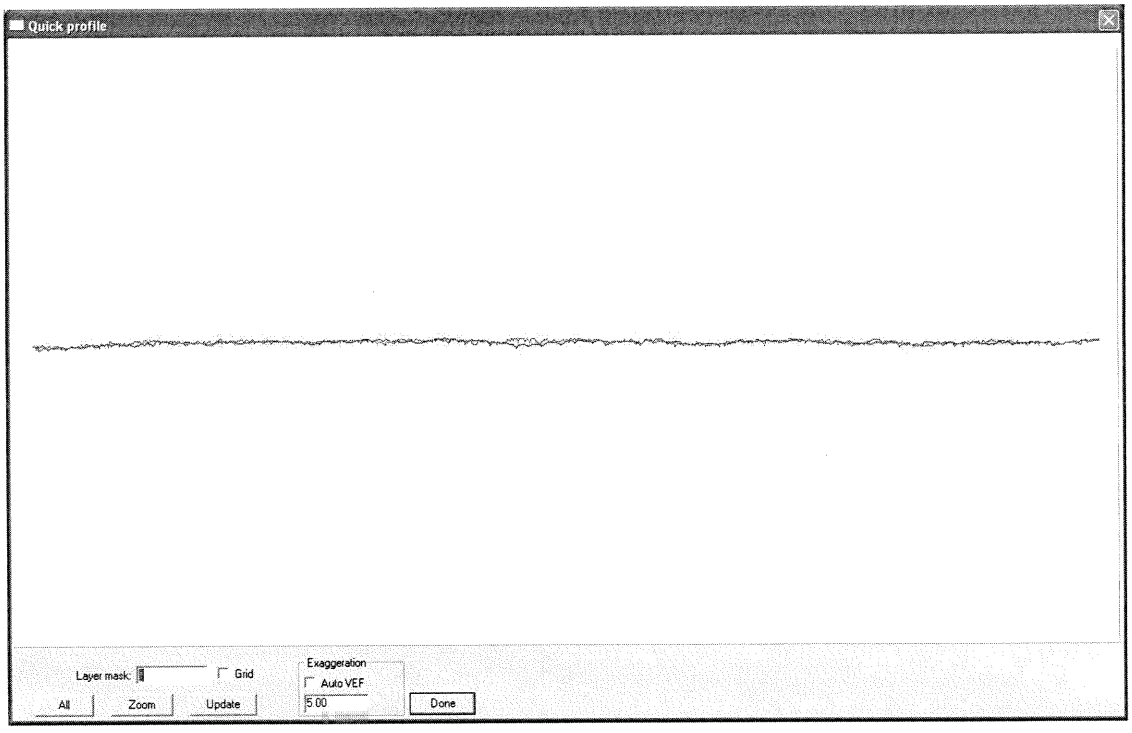


Fig. 23 River Section 5 to River Section 6 Cross Section

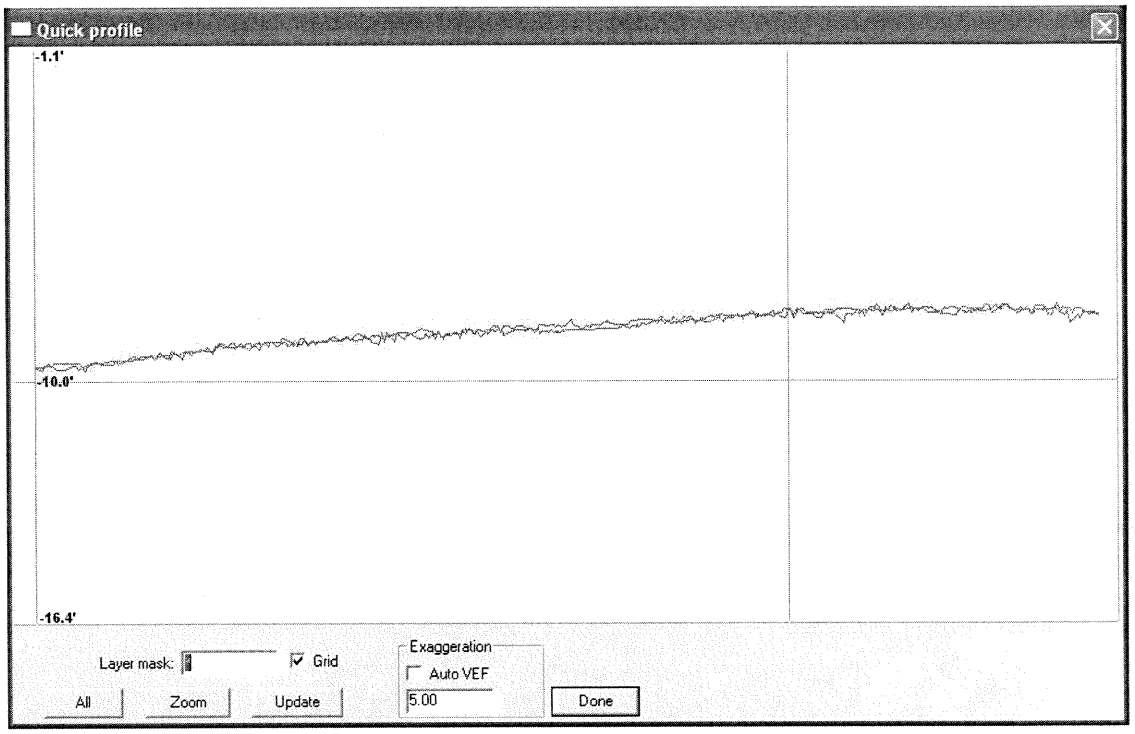


Fig. 24 River Section 6 to River Section 7 Cross Section

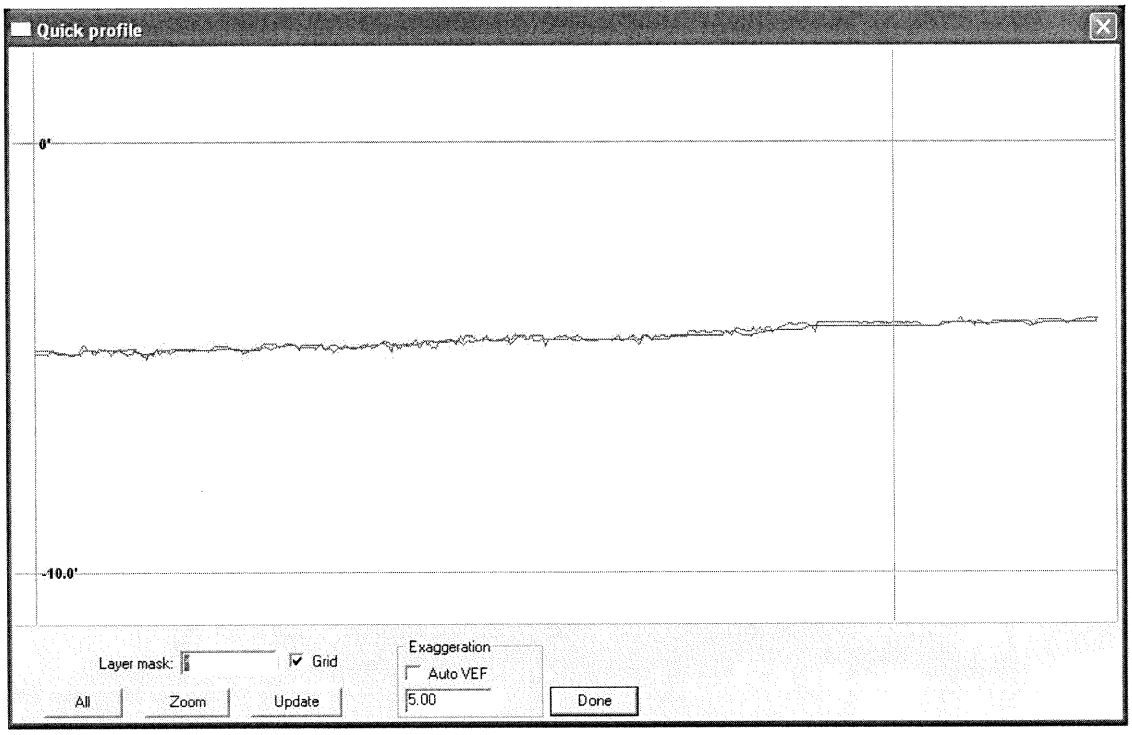


Fig. 25 River Section 7 to River Section 8 Cross Section

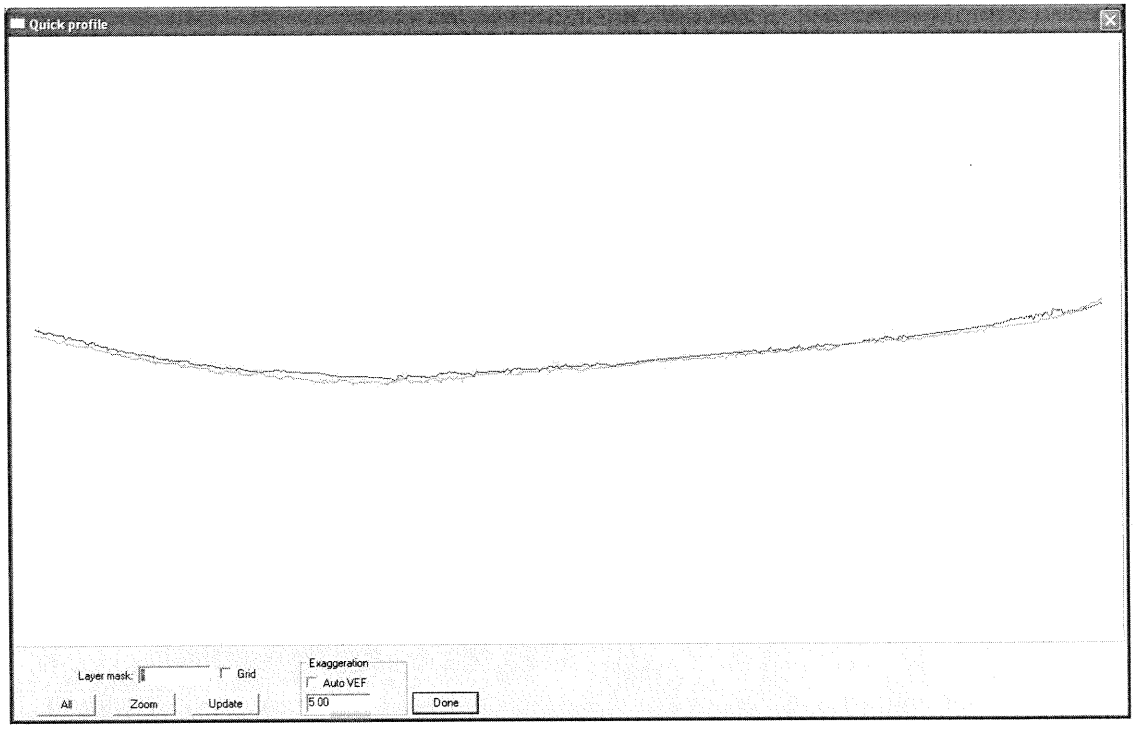


Fig.26 River Section 8 to River Section 9 Cross Section

4.3 Final Products

The DVD contains the following data files:

Directory	Contents	Notes
Corrected Data	Corrected ASCII X,Y,Z	Both +Z and –Z
Report	Main + Control Reports	Adobe PDF format
Pictures	All picture from Rio Grande	
Raw Data	Hypack File	Version 6.2
	Uncorrected ASCII X,Y,Z	Both +Z and -Z
	Raw Tide Files	From Tide Logger

4.4 Control Network Summary

Introduction

Before commencement of the hydrographic portion of the project, a survey team was mobilized to investigate and document existing geodetic control, set temporary control points along the survey area as required and establish the location and access requirements of boat ramps that would be required during the hydrographic portion of the survey. At this time contact was made with the local US Boarder Patrol office to inform them of our plans for the execution of the survey.

1/14/08

Travel from Houston to Brownsville

1/15/08

NGS Monument Search

AB0038 – Not found
AB0058 – Found as described
AB0067 – Found as described
AB0070 – Found as described
AB0073 – Not found
AB0076 – Abandoned (unable to reach)

1/16/08

Monumenting

RIO1, RIO2, RIO3, RIO4, RIO5, RIO6 each monumented with ½" x 4' rebar, 4"x 2' PVC and 80 lbs of concrete.

Measuring

RTK base station set up on AB0070
Vertical check-in at AB0058 and AB0067
Monuments measured: RIO3, RIO4, RIO5, RIO6

1/17/08

Measuring

RTK base station set up on RIO3
Vertical check-in at AB0058
Monuments measured: RIO1, RIO2

Leveling

A water elevation was measured at the location of each tide station

1/18/08

Travel from Brownsville to Houston

HCL Vertical Control Descriptions and Locations

RIO1/Dam

State Plane TX South 4205 **Monumented:** 01/16/2008

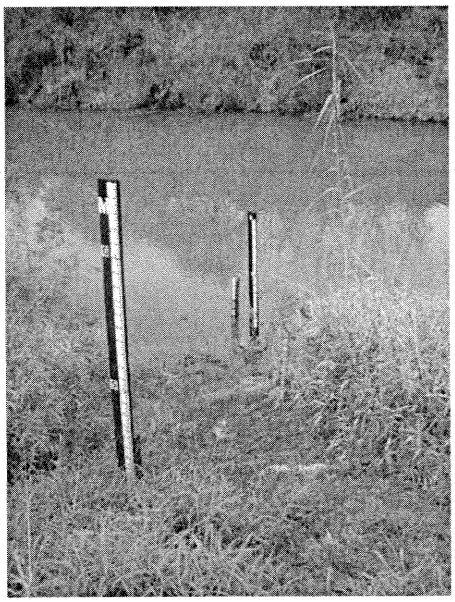
X: 1327792.552
Y: 16481589.457
Z: 11.775

WGS84

Lat: 25°52'32.66880"N
Long: 97°27'19.02954"W

Description:

½" rebar set in concrete and 4" PVC Protruding from ground about 2".



Location:

To get to RIO1 from the intersection of Boca Chica Highway and South Oklahoma Avenue travel south on South Oklahoma for about 4 miles. The road will curve west and become Southmost Road. Continue on Southmost for about 4.45 miles. Turn left at the intersection of Southmost and Monsees Road and travel west for about 0.85 miles. Turn left onto a private asphalt road and go about 0.21 miles to a blue house on the right. Turn right after the house and onto a dirt road that edges a pasture and go about 0.2 miles to a radio tower. Turn left at the tower, go about 80 feet then right down the bank to a terrace with several flood gauges. RIO1 is about 6 feet west of the Gauge that reads 5 and 6 meters, about 75 feet south of the overhead cables, about 200 feet west of the radio tower, about 0.15 miles south of the rock dam.


RIO1
RIO2
RIO3
RIO4
Google


RIO1
Google


RIO1
Google

RIO2/Boat Ramp 1

State Plane TX South 4205 **Monumented:** 01/16/2008

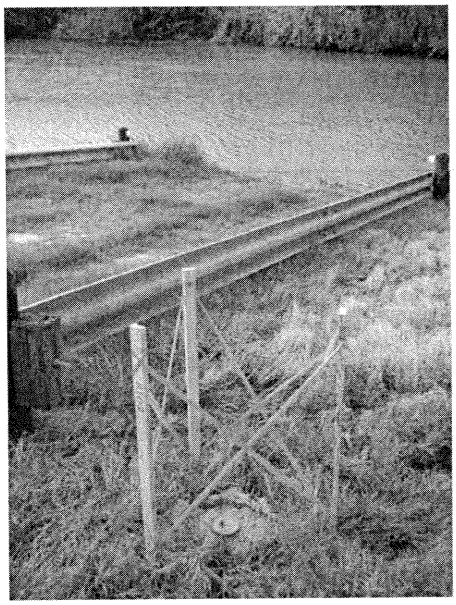
X: 1343340.082
Y: 16474605.754
Z: 7.506

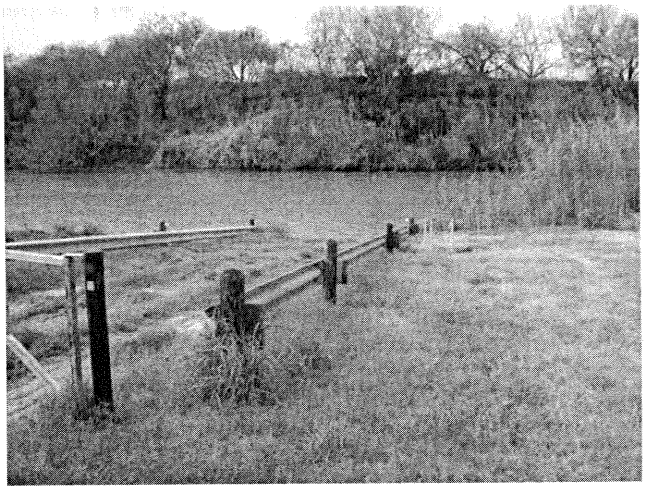
WGS84

Lat: 25°51'22.20382"N
Long: 97°24'29.49095"W

Description:

½" rebar set in concrete and 4" PVC Protruding from ground about 2".



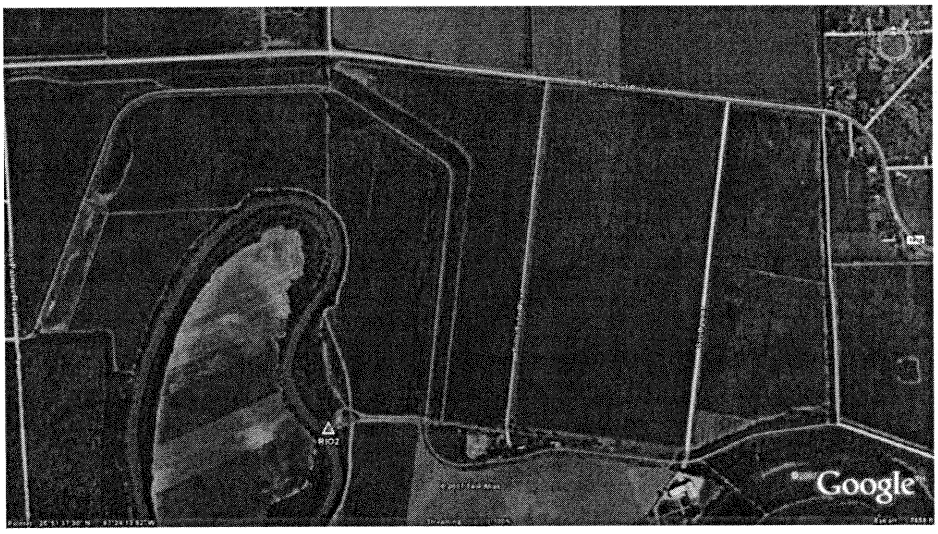


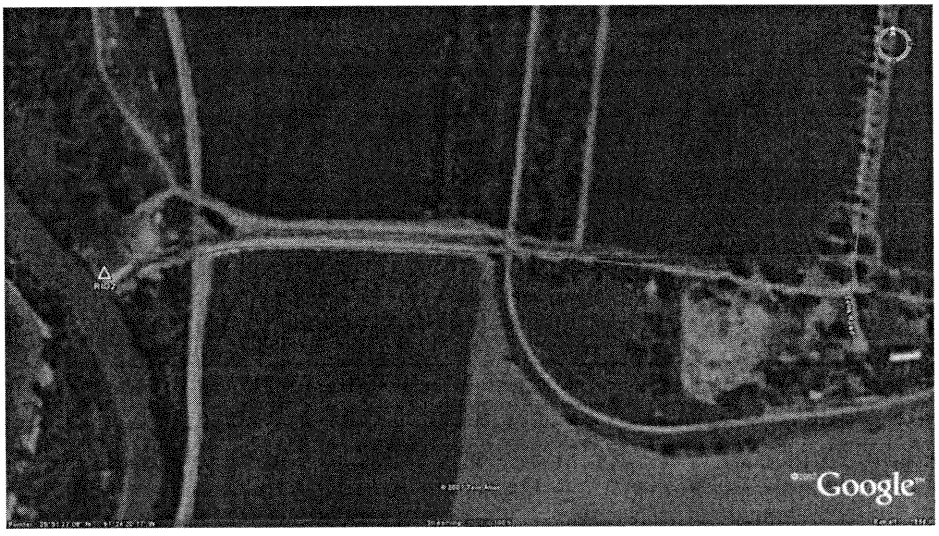
Location:

To get to RIO2 from the intersection of Boca Chica Highway and South Oklahoma Avenue travel south on South Oklahoma for about 4 miles. The road will curve west and become Southmost Road. Continue on Southmost for about 1.6 miles and turn left/south onto Solis Road (Lined by many tall palms). Go about 0.65 miles to the end of Solis Road and turn right/west at the house. Continue west on dirt road about 0.33 miles to RIO2, also the location of Boat Ramp 1. RIO2 is about 50 feet from the waters edge, and about 4 feet north of the north guardrail of the boat ramp.

You must contact Dorothy Irwin (956-542-3065) for permission to enter her property. She was not cooperative with this project so the tide station was accessed by boat.


START
RIO4
RIO3
RIO1
RIO2
Google


RIO2
Google


RIO2
Google

RIO3/Boat Ramp 2

State Plane TX South 4205 **Monumented:** 01/16/2008

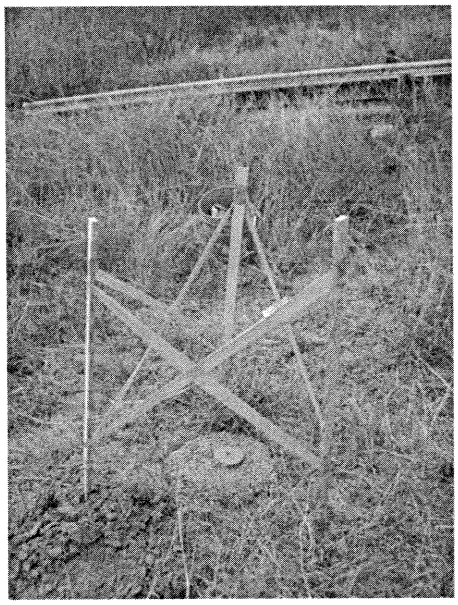
X: 1355268.883
Y: 16484426.917
Z: 8.042

WGS84

Lat: 25°52'58.42625"N
Long: 97°22'17.96705"W

Description:

½" rebar set in concrete and 4" PVC Protruding from ground about 2".



Location:

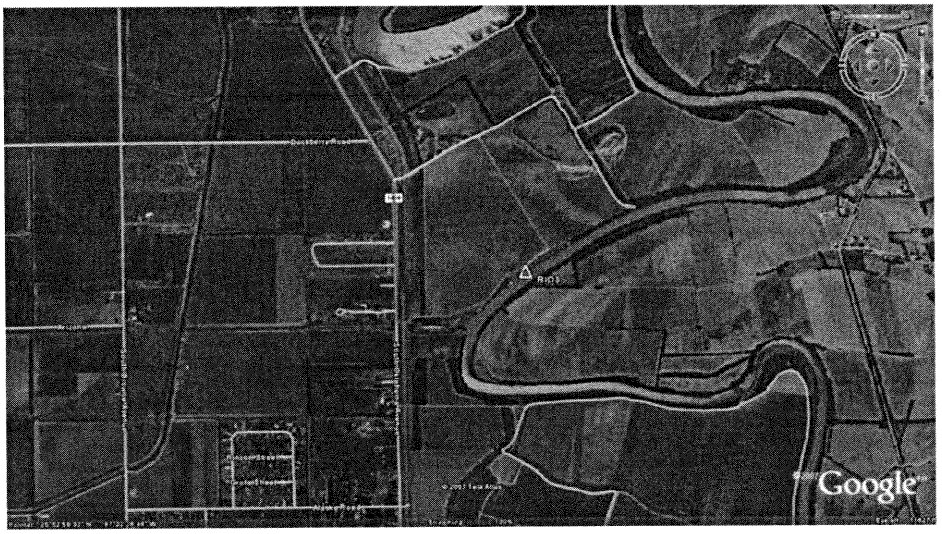
To get to RIO3 from the intersection of Boca Chica Highway and South Oklahoma Avenue travel south on South Oklahoma for about 2.56 miles to an unnamed road on the left with a green pipe gate and a white slat fence. The property is owned by Loop Farms. To get through the gate call Frank Loop (956-551-1984) or Bonnie (956-838-5222) to have them unlock the gate or a key may be provided. Continue through the gate on the caliche about 0.4 miles to Boat Ramp 2 on the right. RIO3 is about 25 feet from the waters edge, and about 20 feet northeast of the downstream guardrail of the ramp.

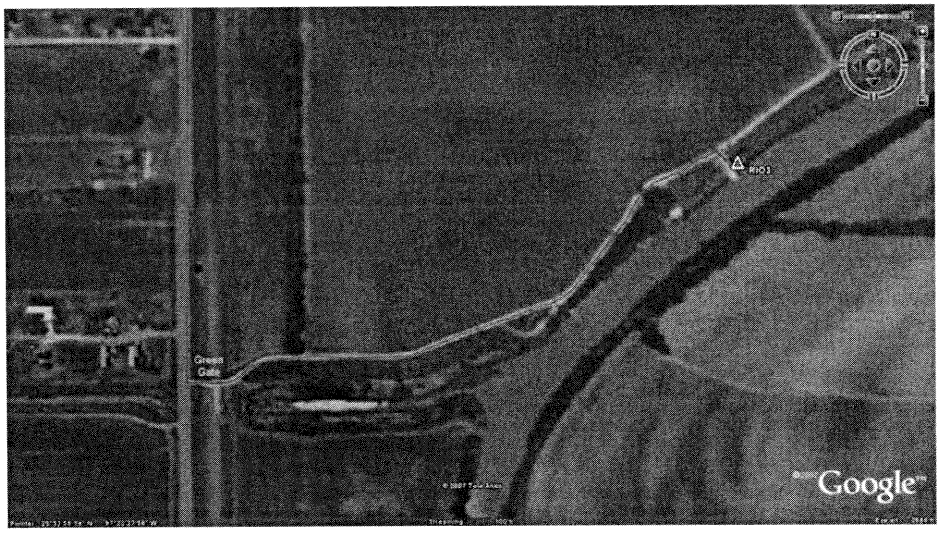
Note:

Always make contact with the owner before entering the property.

Loop Farms
827 S. Oklahoma
956-831-4681 (Store)
956-551-1984 (Frank)


A80058
START
RIO4
Loop Farms
RIO3
RIO1
RIO2
Google


RIO5
Google

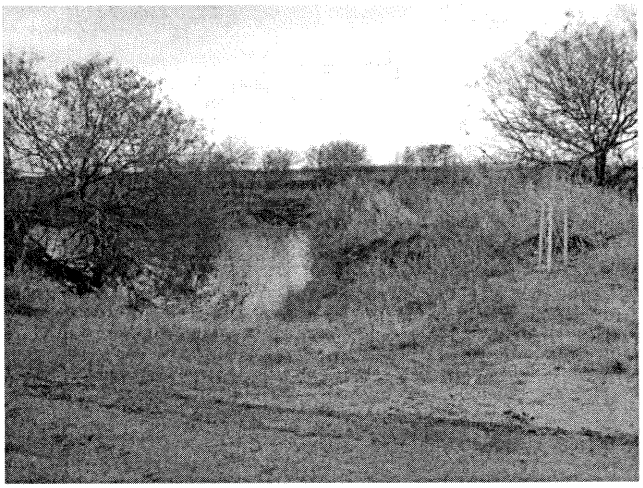

RIO3
Green
Gate
Google

RIO4

State Plane TX South 4205 **Monumented:** 01/16/2008
X: 1357807.321
Y: 16496548.398
Z: 16.857

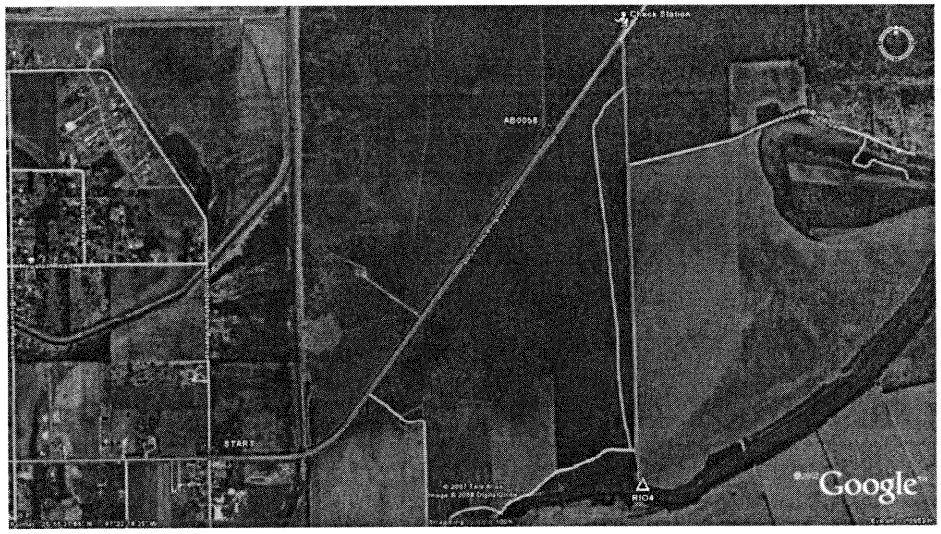
WGS84
Lat: 25°54'58.24343"N
Long: 97°21'48.98194"W

Description:
½" rebar set in concrete and 4" PVC Protruding from ground about 2".



Location:
To get to RIO4 from the intersection of Boca Chica Highway and South Oklahoma Avenue travel East on Boca Chica Highway for about 1.6 miles and turn right/south on Yolanda Rio Road, at the Border Patrol check station. After about 0.33 miles the road will begin to edge a pasture. Continue another 0.8 miles south to the end of the road at the bank of the river. RIO4 is set in the high bank of the river about 50 feet from the waters edge, about 20 feet west of the centerline of a ravine, and about 50 feet east of a sign post used for target practice. This property is also owned by Loop Farms. Call before entering property.


Creek Station
AB0056
START
R104
Google


Creek Station
AB0056
START
R104
Google


R104
Google

RIO5

State Plane TX South 4205 **Monumented:** 01/16/2008
X: 1383964.309
Y: 16512665.248
Z: 7.591

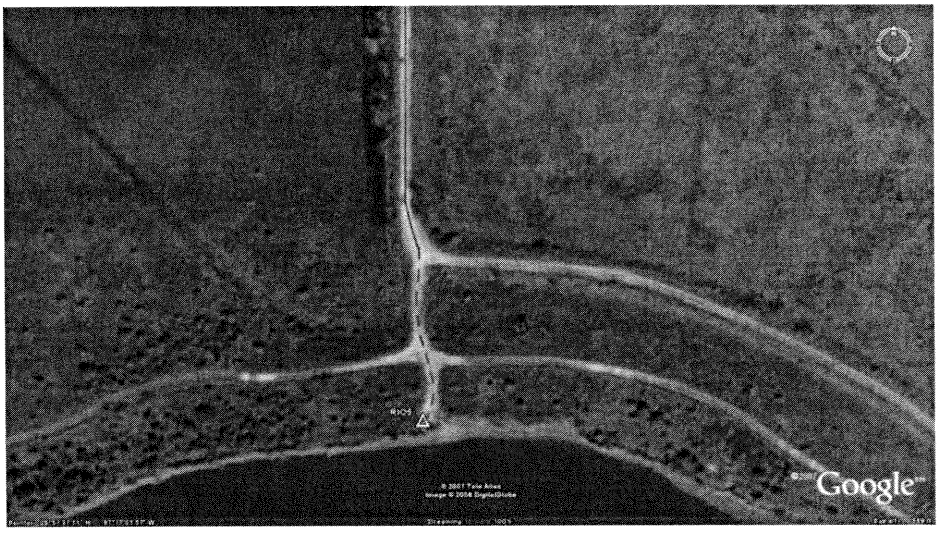
WGS84
Lat: 25°57'35.43942"N
Long: 97°17'00.83923"W

Description:
½" rebar set in concrete and 4" PVC Protruding from ground about 2".

Location:
To get to RIO5 from the intersection of Boca Chica Highway and South Oklahoma Avenue travel East on Boca Chica Highway for about 7.3 miles and turn right/south on an unnamed asphalt road. Go south 0.12 miles to where the road curves left/east. Park, walk about 180 feet south to the bank of the river. RIO5 is about 20 feet from waters edge and about 10 feet west of the centerline of the dirt path.


Check Station
AB0058
RIO4
RIO5
AB0067
AB0070
Loop Farms
Google


RIO5
Google

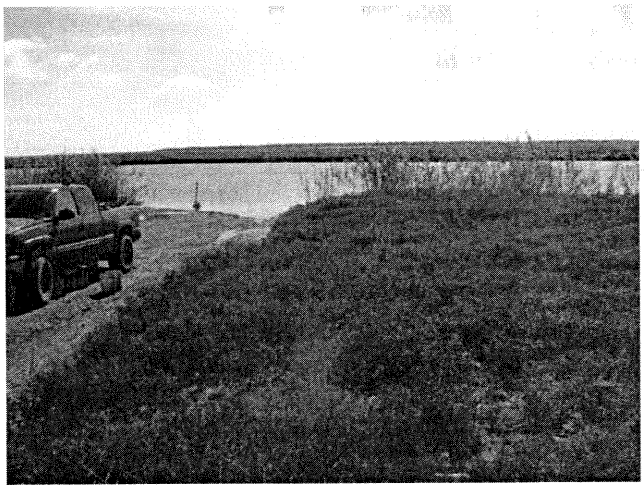

RIO5
Google

RIO6/Boat Ramp 3

State Plane TX South 4205 **Monumented:** 01/16/2008
X: 1409940.629
Y: 16512431.198
Z: 3.256

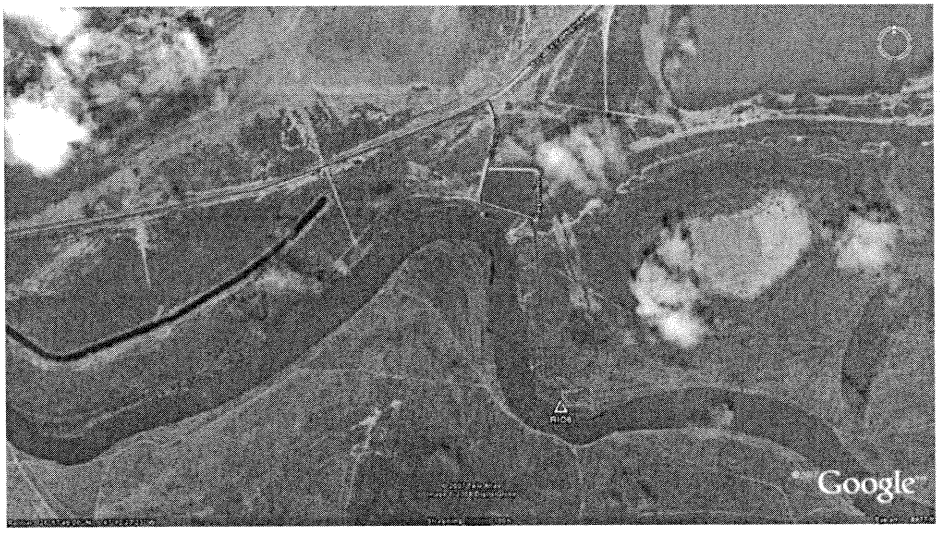
WGS84
Lat: 25°57'30.56127"N
Long: 97°12'16.29546"W

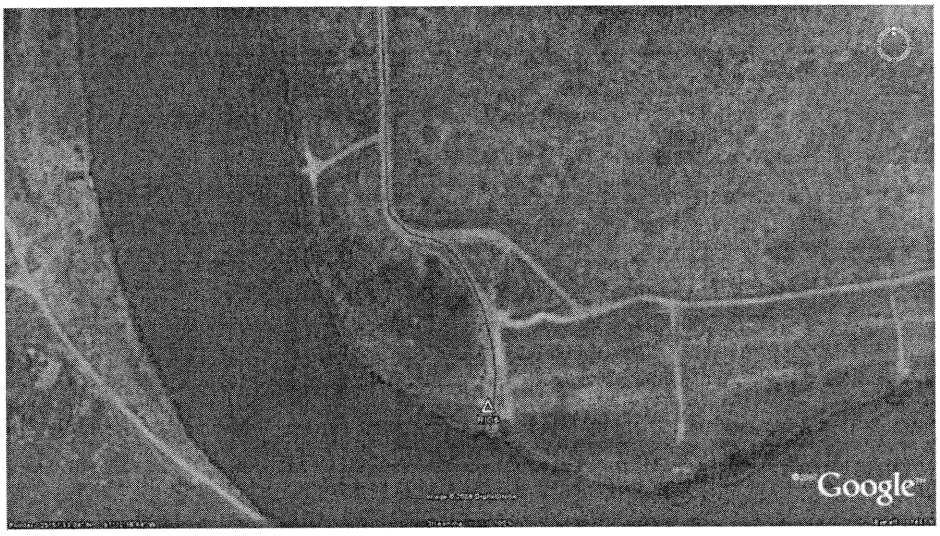
Description:
½" rebar set in concrete and 4" PVC Protruding from ground about 2".



Location:
To get to RIO6 from the intersection of Boca Chica Highway and South Oklahoma Avenue travel East on Boca Chica Highway for about 12.2 miles and turn right/south on Richardson Road in the Tarpon Haven Fish Camp. Follow the semi-paved road for about 0.75 miles to the boat ramp. RIO6 is about 50 feet from waters edge and about 25 feet west of the centerline of the boat ramp. This ramp is owned by Texas Parks and Wildlife. Contact Bryan Winton (956-784-7521) for permission to launch at this ramp.


Google


Google

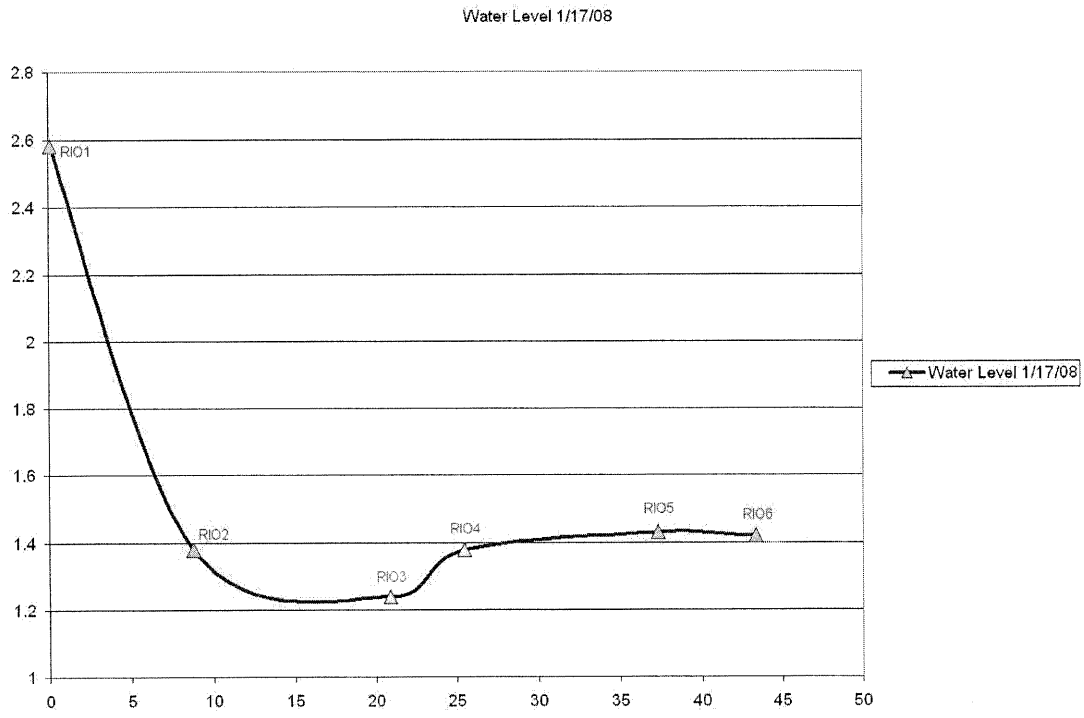

Google

Water Levels

Location	Date	Time	Elevation	Distance From Dam
RIO1	01/17/08	13:45	2.58	0.13
RIO2	01/17/08	13:30	1.38	8.76
RIO3	01/17/08	13:15	1.24	20.90
RIO4	01/17/08	14:15	1.38	25.48
RIO5	01/17/08	14:35	1.43	37.31
RIO6	01/17/08	15:00	1.42	43.35

Distance Between Vertical Controls

Monuments	Distance (River Miles)
Dam-RIO1	0.13
RIO1-RIO2	8.63
RIO2-RIO3	12.14
RIO3-RIO4	4.58
RIO4-RIO5	11.83
RIO5-RIO6	6.04
RIO6_Gulf	5.43
Total	48.78



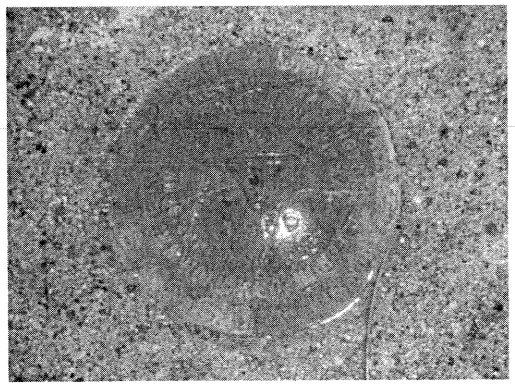
NGS Control Descriptions and Locations
(as found by HCL)

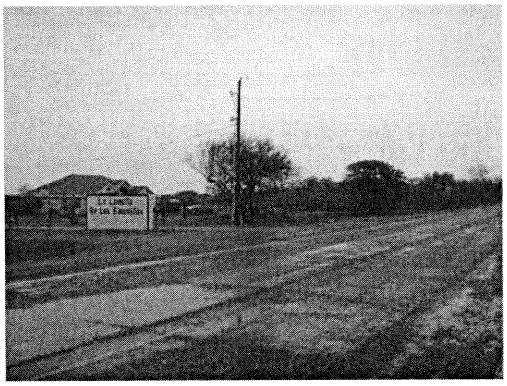
AB0070

State Plane TX South 4205 **Monumented:** 1939
X: 1396844.157
Y: 16514310.183
Z: 29.300

WGS84
Lat: 25°57'50.48043"N
Long: 97°14'39.56100"W

Description:
Triangulation station disk set in the top of a 12" square concrete monument projecting about 1 foot above ground level. Stamped "RANGE 1939".





Location:
To get to AB0070 from the intersection of Boca Chica Highway and South Oklahoma Avenue travel East on Boca Chica Highway for about 9.8 miles. Monument is about 60 feet south-southeast of the centerline of the highway, about 60 feet west of a utility pole with wires that cross the road and across the road from a large white sign that reads "La Lomita De Los Ebanitos".


Check Station
AB0068
R104
R108
AB0067
AB0070
Google


AB0070
Google

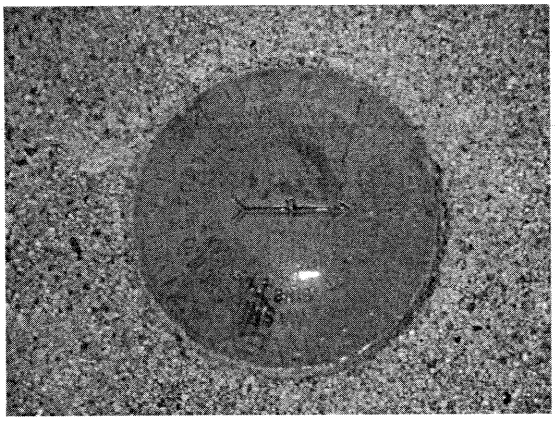

AB0070
Google

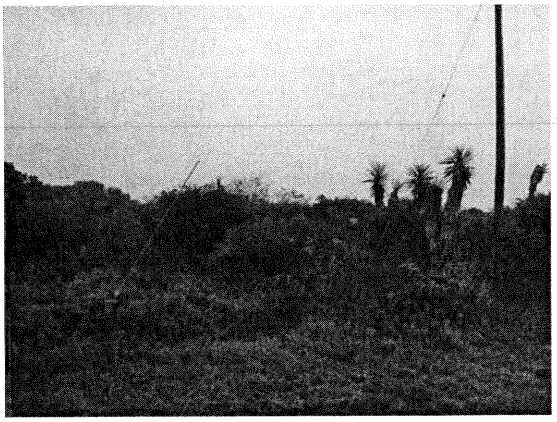
AB0067

State Plane TX South 4205 **Monumented:** 1939
X: 1391393.608
Y: 16514153.798
Z: 22.979

WGS84
Lat: 25°57'49.46524"N
Long: 97°15'39.29093"W

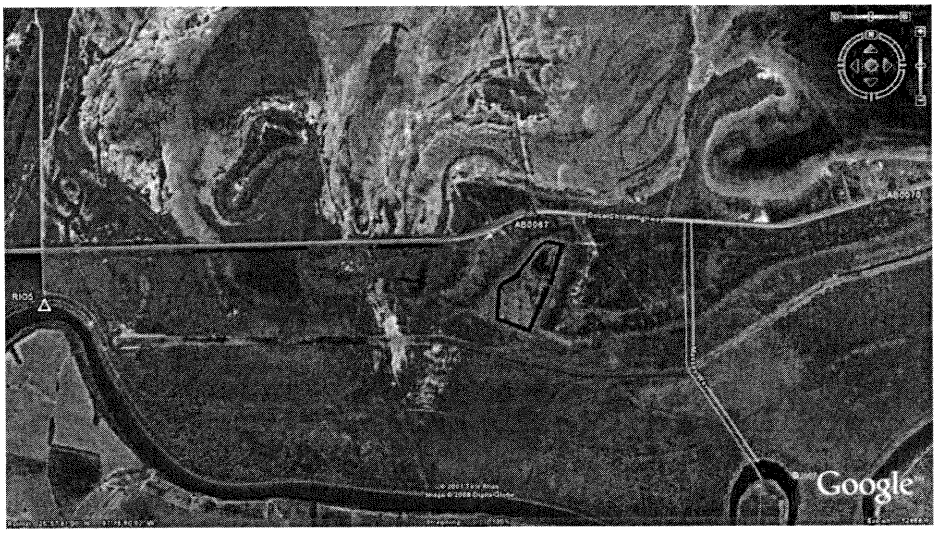
Description:
Azimuth mark disk set in the top of a 12" square concrete monument projecting about 1 foot above ground level. Stamped "RANGE 1939".





Location:
To get to AB0067 from the intersection of Boca Chica Highway and South Oklahoma Avenue travel East on Boca Chica Highway for about 8.75 miles to the east end of a reverse curve. Monument is about 50 feet north of the centerline of the highway, and about 30 feet west of a utility pole.


Check Station
AB0058
R104
R105
AB0067
Google


AB0067
R105
Google

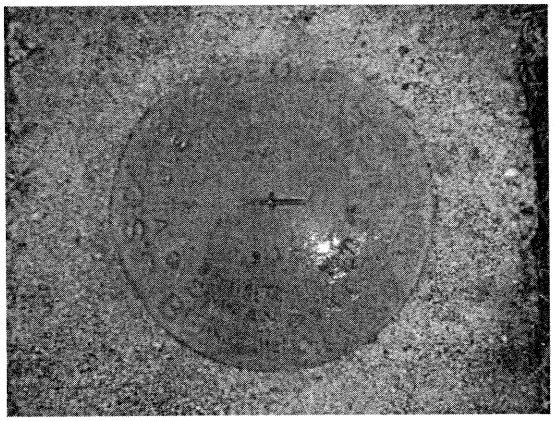

AB0067
Google

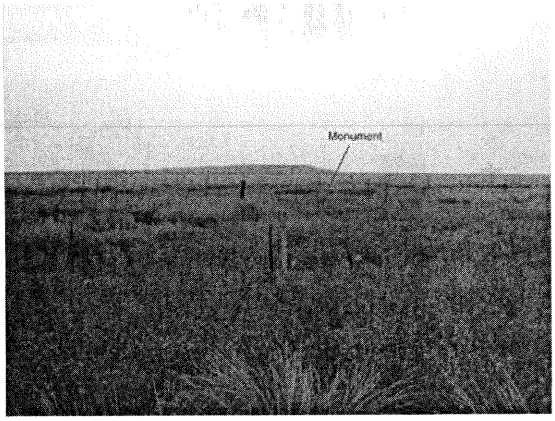
AB0058

State Plane TX South 4205 **Monumented:** 1942
X: 1356512.436
Y: 16501367.840
Z: 8.300

WGS84
Lat: 25°55'46.08734"N
Long: 97°22'02.68846"W

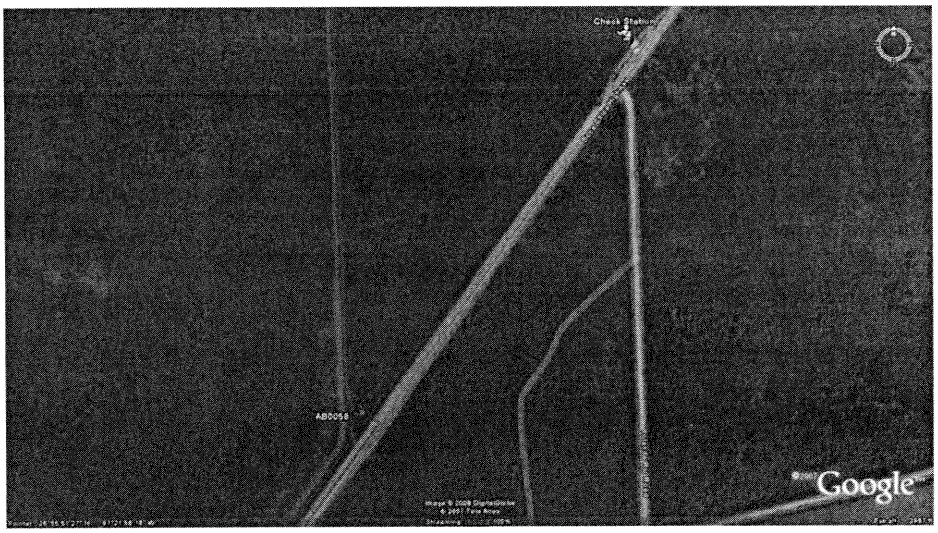
Description:
Bench mark disk set in the top of a 12" square concrete monument projecting about 1 foot above ground level. Stamped "679 1942".

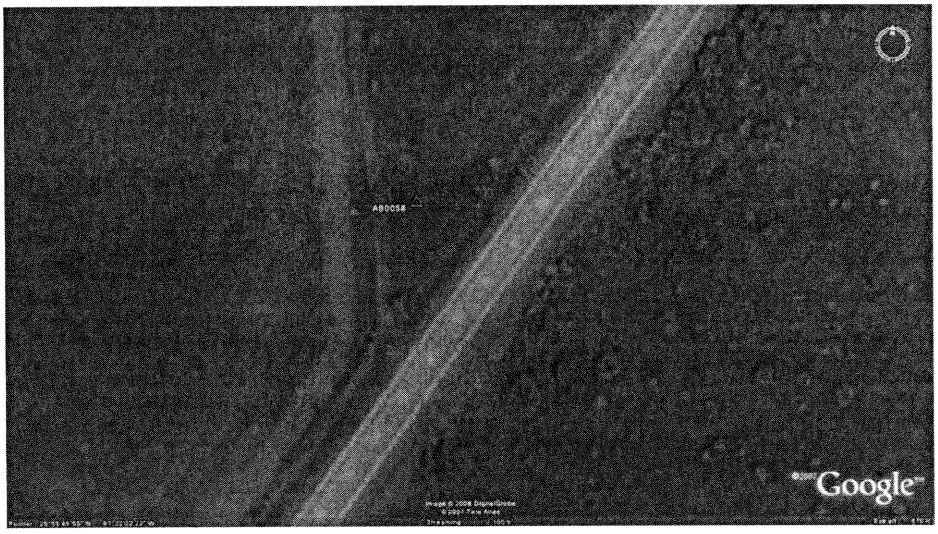




Location:
To get to AB0058 from the intersection of Boca Chica Highway and South Oklahoma Avenue travel East on Boca Chica Highway for about 1.3 miles to a sharp angle in the barbed wire fence on the north side of the highway. Monument is about 100 feet northwest of the centerline of the highway, 0.32 miles southwest of a border patrol check point, about 60 feet east of the barbed wire fence, and 3 feet west of a weathered 4x4 witness post.


Check Station
AB0058
RIO4
RIO3
Google


Check Station
AB0058
Google


AB0058
Google

NGS Control Data Sheets

AB0058 **********
AB0058 DESIGNATION - V 679
AB0058 PID - AB0058
AB0058 STATE/COUNTY- TX/CAMERON
AB0058 USGS QUAD - PALMITO HILL (1983)
AB0058
AB0058 *CURRENT SURVEY CONTROL
AB0058 _____
AB0058* NAD 83(1986)- 25 55 45. (N) 097 22 02. (W) SCALED
AB0058* NAVD 88 - 2.538 (meters) 8.33 (feet) ADJUSTED
AB0058 _____
AB0058 GEOID HEIGHT- -21.51 (meters) GEOID03
AB0058 DYNAMIC HT - 2.534 (meters) 8.31 (feet) COMP
AB0058 MODELED GRAV- 979,043.3 (mgal) NAVD 88
AB0058
AB0058 VERT ORDER - SECOND CLASS 0
AB0058
AB0058.The horizontal coordinates were scaled from a topographic map and have
AB0058.an estimated accuracy of +/- 6 seconds.
AB0058
AB0058.The orthometric height was determined by differential leveling
AB0058.and adjusted in June 1991.
AB0058
AB0058.The geoid height was determined by GEOID03.
AB0058
AB0058.The dynamic height is computed by dividing the NAVD 88
AB0058.geopotential number by the normal gravity value computed on the
AB0058.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AB0058.degrees latitude (g = 980.6199 gals.).
AB0058
AB0058.The modeled gravity was interpolated from observed gravity values.
AB0058
AB0058; North East Units Estimated Accuracy
AB0058;SPC TX S - 5,029,590. 413,490. MT (+/- 180 meters Scaled)
AB0058
AB0058 SUPERSEDED SURVEY CONTROL
AB0058
AB0058 NGVD 29 (??/??/92) 2.634 (m) 8.64 (f) ADJ UNCH 2 0
AB0058
AB0058.Superseded values are not recommended for survey control.
AB0058.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AB0058.See file dsdata.txt to determine how the superseded data were derived.
AB0058
AB0058_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RPP635688(NAD 83)
AB0058_MARKER: DB = BENCH MARK DISK
AB0058_SETTING: 0 = UNSPECIFIED SETTING
AB0058_STAMPING: V 679 1942
AB0058_STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
AB0058_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AB0058+SATELLITE: SATELLITE OBSERVATIONS - January 26, 2005
AB0058
AB0058 HISTORY - Date Condition Report By
AB0058 HISTORY - 1942 MONUMENTED CGS
AB0058 HISTORY - 1949 GOOD NGS
AB0058 HISTORY - 20050126 GOOD IBWC
AB0058
AB0058 STATION DESCRIPTION

AB0058
AB0058'DESCRIBED BY NATIONAL GEODETIC SURVEY 1949
AB0058'9.7 MI NE FROM BROWNSVILLE.
AB0058'TO REACH FROM THE INTERSECTION OF STATE HIGHWAY 4 AND STATE HIGHWAY
AB0058'48, NE OF BROWNSVILLE, GO E ON HIGHWAY 4 ABOUT 6.75 MILES TO BENCH
AB0058'MARK SITE, 96 FT. NW AND ABOUT 1.0 FT. BELOW CENTERLINE OF HIGHWAY,
AB0058'4.0 FT. SE OF TELEPHONE POLE NO. 168, 60 FT. NE OF SHARP ANGLE FENCE
AB0058'CORNER, AND 3.0 FT. W OF 4X4 INCH WOODEN WITNESS POST.
AB0058
AB0058 STATION RECOVERY (2005)
AB0058
AB0058'RECOVERY NOTE BY INT BDRY WTR COMM 2005 (RGF)
AB0058'RECOVERED IN GOOD CONDITION.

AB0067 **********

AB0067 DESIGNATION - RANGE AZ MK
AB0067 PID - AB0067
AB0067 STATE/COUNTY- TX/CAMERON
AB0067 USGS QUAD - PALMITO HILL (1983)
AB0067
AB0067 *CURRENT SURVEY CONTROL
AB0067 _____
AB0067* NAD 83(1986)- 25 57 48. (N) 097 15 39. (W) SCALED
AB0067* NAVD 88 - 7.008 (meters) 22.99 (feet) ADJUSTED
AB0067 _____
AB0067 GEOID HEIGHT- -21.33 (meters) GEOID03
AB0067 DYNAMIC HT - 6.997 (meters) 22.96 (feet) COMP
AB0067 MODELED GRAV- 979,056.3 (mgal) NAVD 88
AB0067
AB0067 VERT ORDER - SECOND CLASS 0
AB0067
AB0067.The horizontal coordinates were scaled from a topographic map and have
AB0067.an estimated accuracy of +/- 6 seconds.
AB0067
AB0067.The orthometric height was determined by differential leveling
AB0067.and adjusted in June 1991.
AB0067
AB0067.The geoid height was determined by GEOID03.
AB0067
AB0067.The dynamic height is computed by dividing the NAVD 88
AB0067.geopotential number by the normal gravity value computed on the
AB0067.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AB0067.degrees latitude (g = 980.6199 gals.).
AB0067
AB0067.The modeled gravity was interpolated from observed gravity values.
AB0067
AB0067; North East Units Estimated Accuracy
AB0067;SPC TX S - 5,033,480. 424,110. MT (+/- 180 meters Scaled)
AB0067
AB0067 SUPERSEDED SURVEY CONTROL
AB0067
AB0067 NGVD 29 (??/??/92) 7.105 (m) 23.31 (f) ADJ UNCH 2 0
AB0067
AB0067.Superseded values are not recommended for survey control.
AB0067.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AB0067.See file dsdata.txt to determine how the superseded data were derived.
AB0067
AB0067_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RPP741727(NAD 83)
AB0067_MARKER: DZ = AZIMUTH MARK DISK
AB0067_SETTING: 30 = SET IN A LIGHT STRUCTURE
AB0067_SP_SET: CONCRETE
AB0067_STAMPING: RANGE 1929
AB0067_MARK LOGO: CGS
AB0067_STABILITY: D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
AB0067
AB0067 HISTORY - Date Condition Report By
AB0067 HISTORY - 1939 MONUMENTED CGS
AB0067 HISTORY - 1942 GOOD NGS
AB0067 HISTORY - 1949 GOOD NGS
AB0067 HISTORY - 1984 GOOD NGS
AB0067 HISTORY - 1987 GOOD USPSQD

AB0067 HISTORY - 19910327 GOOD USPSQD
AB0067
AB0067 STATION DESCRIPTION
AB0067
AB0067'DESCRIBED BY NATIONAL GEODETIC SURVEY 1942
AB0067'16.6 MI NE FROM BROWNSVILLE.
AB0067'TO REACH FROM THE INTERSECTION OF STATE HIGHWAY NUMBER 4 AND U. S.
AB0067'HIGHWAY NUMBER 83 AT BROWNSVILLE, PROCEED NORTHEASTERLY ON STATE
AB0067'HIGHWAY NUMBER 4, GO 8.1 MILES TO A BRIDGE AND CATTLE GUARD, CONTINUE
AB0067'ON STATE HIGHWAY NUMBER 4 AND GO 8.5 MILES TO THE EAST END OF A
AB0067'REVERSE CURVE AND SITE OF BENCH MARK. BENCH MARK IS 1.0 MILE WEST OF
AB0067'TRIANGULATION STATION RANGE. 54 FEET NORTH OF AND ABOUT 1.5 FEET
AB0067'ABOVE THE CENTERLINE OF THE HIGHWAY. 3.0 FEET EAST OF A 4 BY 4 INCH
AB0067'WOODEN MARKER POST. MONUMENT PROJECTS 1.0 FOOT.
AB0067
AB0067 STATION RECOVERY (1949)
AB0067
AB0067'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1949
AB0067'RECOVERED IN GOOD CONDITION.
AB0067
AB0067 STATION RECOVERY (1984)
AB0067
AB0067'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1984
AB0067'ABOUT IT IS 97 METERS EAST OF HIGH GROUND ALONG THE HIGHWAY, 16.0
AB0067'METERS NORTH OF THE HIGHWAY CENTER, 8.4 METERS WEST OF A GUY POLE,
AB0067'AND 52 METERS WEST OF A DIRT ROAD
AB0067
AB0067 STATION RECOVERY (1987)
AB0067
AB0067'RECOVERY NOTE BY US POWER SQUADRON 1987 (GES)
AB0067'RECOVERED IN GOOD CONDITION.
AB0067
AB0067 STATION RECOVERY (1991)
AB0067
AB0067'RECOVERY NOTE BY US POWER SQUADRON 1991 (GES)
AB0067'RECOVERED IN GOOD CONDITION.

AB0070 **********
AB0070 DESIGNATION - RANGE
AB0070 PID - AB0070
AB0070 STATE/COUNTY- TX/CAMERON
AB0070 USGS QUAD - MOUTH OF RIO GRANDE (1970)
AB0070
AB0070 *CURRENT SURVEY CONTROL
AB0070 _____
AB0070* NAD 83(1993)- 25 57 50.48043(N) 097 14 39.56099(W) ADJUSTED
AB0070* NAVD 88 - 8.930 (meters) 29.30 (feet) ADJUSTED
AB0070 _____
AB0070 LAPLACE CORR- 1.51 (seconds) DEFLEC99
AB0070 GEOID HEIGHT- -21.31 (meters) GEOID03
AB0070 DYNAMIC HT - 8.915 (meters) 29.25 (feet) COMP
AB0070 MODELED GRAV- 979,057.8 (mgal) NAVD 88
AB0070
AB0070 HORZ ORDER - SECOND
AB0070 VERT ORDER - SECOND CLASS 0
AB0070
AB0070.The horizontal coordinates were established by classical geodetic methods
AB0070.and adjusted by the National Geodetic Survey in February 1996.
AB0070
AB0070.The orthometric height was determined by differential leveling
AB0070.and adjusted in June 1991.
AB0070
AB0070.The Laplace correction was computed from DEFLEC99 derived deflections.
AB0070
AB0070.The geoid height was determined by GEOID03.
AB0070
AB0070.The dynamic height is computed by dividing the NAVD 88
AB0070.geopotential number by the normal gravity value computed on the
AB0070.Geodetic Reference System of 1980 (GRS 80) ellipsoid at 45
AB0070.degrees latitude (g = 980.6199 gals.).
AB0070
AB0070.The modeled gravity was interpolated from observed gravity values.
AB0070
AB0070; North East Units Scale Factor Converg.
AB0070;SPC TX S - 5,033,571.811 425,758.951 MT 1.00005722 +0 34 12.3
AB0070;SPC TX S -16,514,310.18 1,396,844.16 sFT 1.00005722 +0 34 12.3
AB0070;UTM 14 - 2,872,878.841 675,774.678 MT 0.99998150 +0 46 07.8
AB0070
AB0070! - Elev Factor x Scale Factor = Combined Factor
AB0070!SPC TX S - 1.00000194 x 1.00005722 = 1.00005916
AB0070!UTM 14 - 1.00000194 x 0.99998150 = 0.99998344
AB0070
AB0070: Primary Azimuth Mark Grid Az
AB0070:SPC TX S - PORT ISABEL N TANK 011 39 28.8
AB0070:UTM 14 - PORT ISABEL N TANK 011 27 33.3
AB0070
AB0070|----------|
AB0070| PID Reference Object Distance Geod. Az |
AB0070| dddmmss.s |
AB0070| AB1497 PORT ISABEL N TANK APPROX.12.0 KM 0121341.1 |
AB0070| AB0071 RANGE RM 1 38.700 METERS 01620 |
AB0070| CV2854 RANGE RM 3 39.200 METERS 01631 |
AB0070| AB1492 WILSON APPROX.11.5 KM 0512432.3 |
AB0070| AB1370 PORT BROWNSVILLE MUNICIPAL TK APPROX.16.0 KM 2652556.5 |

AB0070| AB0067 RANGE AZ MK 2685528.2 |
AB0070| AB0072 RANGE RM 2 41.873 METERS 30316 |
AB0070|----------|
AB0070
AB0070 SUPERSEDED SURVEY CONTROL
AB0070
AB0070 NAD 83(1986)- 25 57 50.49472(N) 097 14 39.51200(W) AD( ) 2
AB0070 NAD 27 - 25 57 49.20100(N) 097 14 38.60400(W) AD( ) 2
AB0070 NGVD 29 (??/??/92) 9.027 (m) 29.62 (f) ADJ UNCH 2 0
AB0070
AB0070.Superseded values are not recommended for survey control.
AB0070.NGS no longer adjusts projects to the NAD 27 or NGVD 29 datums.
AB0070.See file dsdata.txt to determine how the superseded data were derived.
AB0070
AB0070_U.S. NATIONAL GRID SPATIAL ADDRESS: 14RPP7577572879(NAD 83)
AB0070_MARKER: DS = TRIANGULATION STATION DISK
AB0070_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
AB0070_SP_SET: SET IN TOP OF CONCRETE MONUMENT
AB0070_STAMPING: RANGE 1939
AB0070_STABILITY: C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO
AB0070+STABILITY: SURFACE MOTION
AB0070_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
AB0070+SATELLITE: SATELLITE OBSERVATIONS - February 07, 2005
AB0070

AB0070	HISTORY	- Date	Condition	Report By
AB0070	HISTORY	- 1939	MONUMENTED	CGS
AB0070	HISTORY	- 1942	GOOD	CGS
AB0070	HISTORY	- 1942	GOOD	NGS
AB0070	HISTORY	- 1945	GOOD	CGS
AB0070	HISTORY	- 1949	GOOD	CGS
AB0070	HISTORY	- 1949	GOOD	NGS
AB0070	HISTORY	- 1958	GOOD	AMS
AB0070	HISTORY	- 1968	GOOD	CGS
AB0070	HISTORY	- 1970	GOOD	NGS
AB0070	HISTORY	- 1984	GOOD	NGS
AB0070	HISTORY	- 1987	GOOD	USPSQD
AB0070	HISTORY	- 1988	GOOD	USPSQD
AB0070	HISTORY	- 19910327	GOOD	USPSQD
AB0070	HISTORY	- 19910427	GOOD	USPSQD
AB0070	HISTORY	- 20050207	GOOD	IBWC

AB0070
AB0070 STATION DESCRIPTION
AB0070
AB0070'DESCRIBED BY COAST AND GEODETIC SURVEY 1939 (PLB)
AB0070'STATION RANGE IS LOCATED ABOUT 16-1/2 MILES ENE OF BROWNSVILLE,
AB0070'ABOUT 8-1/4 MILES SSW OF PORT ISABEL AND ABOUT 0.75 MILE
AB0070'W OF A GOVERNMENT TARGET RANGE. IT IS ON TOP OF AN EW RIDGE
AB0070'THAT IS COVERED WITH THICK BRUSH, 55 FEET S OF THE CENTER
AB0070'LINE OF TEXAS STATE HIGHWAY 4, ABOUT MIDWAY BETWEEN TWO CURVES,
AB0070'ONE AT EACH END OF THE RIDGE.
AB0070'
AB0070'SURFACE, UNDERGROUND, REFERENCE, AND AZIMUTH MARKS ARE
AB0070'STANDARD BRONZE DISKS SET IN CONCRETE.
AB0070'THE AZIMUTH MARK IS 0.9 MILE W OF THE
AB0070'STATION, 50 FEET N OF CENTER LINE OF ROAD, ON A CURVE TO
AB0070'THE SW, 20 FEET N OF A TELEPHONE LINE.
AB0070'

AB0070'TO REACH FROM THE N END OF THE GATEWAY BRIDGE ACROSS THE
AB0070'RIO GRANDE RIVER IN BROWNSVILLE, GO NE ON TEXAS STATE HIGHWAY
AB0070'4 FOR 2.3 MILES TO THE JUNCTION OF TEXAS STATE HIGHWAY 48
AB0070'AND NO. 4. TURN RIGHT (E), ON STATE HIGHWAY 4 FOR 14.0
AB0070'MILES TO THE STATION ON THE S SIDE OF THE ROAD.
AB0070'
AB0070'HEIGHT OF LIGHT ABOVE STATION MARK - 16 METERS.
AB0070
AB0070 STATION RECOVERY (1942)
AB0070
AB0070'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1942 (CJB)
AB0070'STATION, REFERENCE MARKS NOS. 1 AND 2 AND AZIMUTH MARK WAS
AB0070'RECOVERED AND FOUND TO BE IN GOOD CONDITION.
AB0070'
AB0070'STATION IS ON THE TOP OF AN E-W BRUSH-COVERED RIDGE, ABOUT
AB0070'8.3 MILES SSW OF PORT ISABEL. IT IS 55.0 FEET S OF AND ABOUT
AB0070'4.0 FEET ABOVE THE CENTER LINE OF STATE HIGHWAY 4 AND 3.0
AB0070'FEET N OF A 4- BY 4-INCH WOODEN MARKER POST. IT IS STAMPED
AB0070'RANGE 1939. THE MONUMENT PROJECTS ABOUT 0.8 FOOT.
AB0070'
AB0070'REFERENCE MARK NO. 1 IS 127.0 FEET N OF THE STATION,
AB0070'42 FEET N OF THE CENTER LINE OF STATE HIGHWAY 4. IT IS STAMPED
AB0070'RANGE NO. 1 1939. THE MONUMENT PROJECTS ABOUT 0.7 FOOT.
AB0070'
AB0070'REFERENCE MARK NO. 2 IS ABOUT MIDWAY BETWEEN
AB0070'TWO CURVES THAT ARE ABOUT 0.8 MILE APART, 135.0 FEET NW OF
AB0070'THE STATION, 38.0 FEET N OF AND ABOUT THE SAME ELEVATION
AB0070'AS THE CENTER LINE OF THE HIGHWAY. IT IS STAMPED RANGE
AB0070'NO. 2 1939.
AB0070'
AB0070'AZIMUTH MARK IS ABOUT 1.0 MILE W OF THE STATION,
AB0070'AT THE E END OF AN S CURVE, 54.0 FEET N OF AND ABOUT THE
AB0070'SAME ELEVATION AS THE CENTER LINE OF STATE HIGHWAY 4, AND
AB0070'3.0 FEET E OF A 4- BY 4-INCH WOODEN MARKER POST. IT IS
AB0070'STAMPED RANGE 1939. THE MONUMENT PROJECTS ABOUT 1.0 FOOT.
AB0070
AB0070 STATION RECOVERY (1942)
AB0070
AB0070'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1942
AB0070'17.6 MI NE FROM BROWNSVILLE.
AB0070'TO REACH FROM THE INTERSECTION OF STATE HIGHWAY NUMBER 4 AND U. S.
AB0070'HIGHWAY NUMBER 83 AT BROWNSVILLE, PROCEED NORTHEASTERLY ON STATE
AB0070'HIGHWAY NUMBER 4, GO 8.1 MILES TO A BRIDGE AND CATTLEGUARD, CONTINUE
AB0070'ON STATE HIGHWAY NUMBER 4 AND GO 9.5 MILES TO SITE OF BENCH MARK.
AB0070'BENCH MARK IS ON TOP OF A NARROW EAST-WEST RIDGE. IT IS 135 FEET
AB0070'SOUTHEAST OF REFERENCE MARK NUMBER 2. 127 FEET SOUTH OF REFERENCE
AB0070'MARK NUMBER 1. 55 FEET SOUTH OF AND ABOUT 4.0 FEET ABOVE THE
AB0070'CENTERLINE OF THE HIGHWAY. AND 3.0 FEET NORTH OF A 4 BY 4 INCH WOODEN
AB0070'MARKER POST. POST PROJECTS 0.8 FOOT.
AB0070
AB0070 STATION RECOVERY (1945)
AB0070
AB0070'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1945 (EBL)
AB0070'RANGE SURFACE CENTER MARK, R.M. NO. 1, R.M. NO. 2, AND AZIMUTH
AB0070'MARK RECOVERED AS DESCRIBED IN GOOD CONDITION. ORIGINAL DESCRIPTION
AB0070'IS ADEQUATE EXCEPT SPEEDOMETER MILEAGE DOES NOT CHECK AND
AB0070'SHOULD BE AMMENDED AS FOLLOWS--

AB0070'
AB0070'STATION RANGE IS LOCATED 18.1 MILES EASTWARD FROM BROWNSVILLE
AB0070'POST OFFICE, 15.4 MILES FROM INTERSECTION OF STATE HIGHWAYS
AB0070'4 AND 48 AND 65.8 FEET SOUTH OF CENTER LINE OF CONCRETE
AB0070'PAVEMENT OF STATE HIGHWAY 4.
AB0070'
AB0070'A 25 FOOT WOODEN TOWER WAS BUILT OVER CENTER MARK BY ASTRONOMIC
AB0070'PARTY.
AB0070
AB0070 STATION RECOVERY (1949)
AB0070
AB0070'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1949 (GEM)
AB0070'STATION, AZIMUTH, AND REFERENCE MARKS RECOVERED IN GOOD
AB0070'CONDITION. 1939 AND 1942 DESCRIPTIONS ADEQUATE WITH MILEAGE
AB0070'AS AMENDED IN 1942 AND 1945.
AB0070
AB0070 STATION RECOVERY (1949)
AB0070
AB0070'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1949
AB0070'RECOVERED IN GOOD CONDITION.
AB0070
AB0070 STATION RECOVERY (1958)
AB0070
AB0070'RECOVERY NOTE BY US ARMY MAP SERVICE (NOW DMA) 1958
AB0070'STATION WAS RECOVERED AS DESCRIBED EXCEPT IT SHOULD READ
AB0070'66 FEET SOUTH OF THE CENTERLINE OF HIGHWAY 4.
AB0070'
AB0070'THE STATION IS LOCATED ON THE HIGHEST POINT OF A RIDGE IN
AB0070'A SMALL CLEARING. IT IS 66 FEET SOUTH OF CENTERLINE OF
AB0070'ROAD. 20 FEET WEST OF WEST TIP OF BUSH. 10 FEET EAST OF
AB0070'EAST TIP OF SMALLBUSH. 55 FEET NORTH OF LONE TREE IN CLEARING.
AB0070
AB0070 STATION RECOVERY (1968)
AB0070
AB0070'RECOVERY NOTE BY COAST AND GEODETIC SURVEY 1968 (JKW)
AB0070'STATION MARK AND REFERENCE MARK 1 RECOVERED IN GOOD CONDITION.
AB0070'REFERENCE MARK 2 IS DESTROYED, AS IT WAS FOUND ON ITS SIDE.
AB0070'THE MILEAGE GIVEN IN THE NOTE BY G.E.M., JR., IN 1949 WAS
AB0070'FOUND TO BE ACCURATE.
AB0070
AB0070 STATION RECOVERY (1970)
AB0070
AB0070'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1970 (AH)
AB0070'THE STATION WAS RECOVERED AS DESCRIBED BY C.J.B. IN 1942,
AB0070'THE STATION MARK AND REFERENCE MARK 2 WERE FOUND IN GOOD
AB0070'CONDITION, REFERENCE MARK 1 WAS FOUND LEANING OVER AND WAS
AB0070'STRAIGHTENED UP AT THIS TIME IT WAS RESTAMPED NO 3. THE
AB0070'AZIMUTH MARK WAS NOT RECOVERED.
AB0070'
AB0070'A COMPLETE NEW DESCRIPTION FOLLOS.
AB0070'
AB0070'THE STATION IS LOCATED ABOUT 15 MILES EAST OF BROWNSVILLE
AB0070'AND 7 MILES WEST OF THE GULF OF MEXICO.
AB0070'
AB0070'TO REACH FROM THE INTERSECTION OF STATE HIGHWAYS 4 AND 48
AB0070'IN THE NORTHEAST SECTION OF BROWNSVILLE, GO EAST ON HIGHWAY
AB0070'4 FOR 14.4 MILES TO THE STATION ON THE RIGHT.

AB0070'
AB0070'THE STATION MARKS ARE STANDARD DISKS STAMPED RANGE 1939.
AB0070'THE SURFACE DISK IS SET IN THE TOP OF A 12-INCH SQUARE CONCRETE
AB0070'MONUMENT THAT PROJECTS 12 INCHES ABOVE THE GROUND SURFACE.
AB0070'IT IS 84 FEET SOUTH-SOUTHEAST OF A POWERLINE POLE AND 66 FEET
AB0070'SOUTH-SOUTHEAST OF THE CENTERLINE OF HIGHWAY 4. THE UNDERGROUND
AB0070'DISK IS SET IN THE TOP OF AN IRREGULAR MASS OF CONCRETE
AB0070'42 INCHES BELOW THE GROUND SURFACE.
AB0070'
AB0070'REFERENCE MARK 2, IS A STANDARD DISK STAMPED RANGE NO 2
AB0070'1939, IT IS SET IN THE TOP OF A 12-INCH SQUARE CONCRETE
AB0070'MONUMENT THAT PROJECTS 8 INCHES. IT IS 89 FEET NORTHWEST
AB0070'OF A POWERLINEPOLE AND 38 FEET NORTH-NORTHWEST OF THE CENTERLINE
AB0070'OF THE HIGHWAY.
AB0070'
AB0070'REFERENCE MARK 3, IS A STANDARD DISK STAMPED RANGE NO 3
AB0070'1939 1970, IT IS SET IN THE TOP OF A 12-INCH SQUARE CONCRETE
AB0070'MONUMENT THAT PROJECTS 6 INCHES ABOVE THE GROUND SURFACE.
AB0070'IT IS 43 FEET NORTHWEST OF THE CENTERLINE OF THE HIGHWAY.
AB0070'
AB0070'HEIGHT OF LIGHT ABOVE STATION MARK 1.2 METERS.
AB0070
AB0070 STATION RECOVERY (1984)
AB0070
AB0070'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1984
AB0070'MARK IS ON THE SOUTH TIGHT-OF-WAY LINE OF STATE HIGHWAY 4, 20.0
AB0070'METERS SOUTH-SOUTHEAST OF THE HIGHWAY CENTER, 21.1 METERS WEST OF A
AB0070'UTILITY POLE WITH WIRES ACROSS THE ROAD, AND 25.4 METERS
AB0070'EAST-SOUTHEAST OF A UTILTIY POLE. MARK PROJECTS 30 CM. IT IS ACROSS
AB0070'ROAD FROM A CLOSED-DOWN RV PARK.
AB0070
AB0070 STATION RECOVERY (1987)
AB0070
AB0070'RECOVERY NOTE BY US POWER SQUADRON 1987 (GES)
AB0070'RECOVERED IN GOOD CONDITION.
AB0070
AB0070 STATION RECOVERY (1988)
AB0070
AB0070'RECOVERY NOTE BY US POWER SQUADRON 1988 (GES)
AB0070'RECOVERED IN GOOD CONDITION.
AB0070
AB0070 STATION RECOVERY (1991)
AB0070
AB0070'RECOVERY NOTE BY US POWER SQUADRON 1991 (GES)
AB0070'RECOVERED IN GOOD CONDITION.
AB0070
AB0070 STATION RECOVERY (1991)
AB0070
AB0070'RECOVERY NOTE BY US POWER SQUADRON 1991 (GES)
AB0070'RECOVERED IN GOOD CONDITION.
AB0070
AB0070 STATION RECOVERY (2005)
AB0070
AB0070'RECOVERY NOTE BY INT BDRY WTR COMM 2005 (RGF)
AB0070'RECOVERED IN GOOD CONDITION.

Local Contacts

Border Patrol – (956)547-3101
Jerry Blackwell
Edgar Cano
Jose Rodriguez

Cameron County Sheriff's Department – (956)554-6700

Emergency – 911

Brownsville Texas Parks and Wildlife
Bryan Winton – (956)784-7521
Game Wardens – (956)546-1952

International Boundary and Water Commission – (956)565-3150

Loop Farms aka Whitewing Ranch
Bonnie – (956)838-5222
Frank – (956)551-1984
Jeff – (956)592-2166
Store – (956)831-4681

Dorothy Irwin – (956)542-3065

Daily Logs

Date 1/14/2008

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

Project: Rio Grande
Job No:
Vessel:
Location: Brownsville, TX
Equipment: Leica Trimble RTK
Model No. Runner24 5700 / 5800

Personnel	Miles Becker	Scott Mcdonald						
Title:	Project Mgr	Snr Surveyor						

Time	Activity
12:30:00	Depart from Houston, Texas for Brownsville, Texas with all RTK survey equipment.
19:00:00	Arrive hotel in Brownsville, Texas.

Date 1/15/2008

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

Project: Rio Grande
Job No:
Vessel:
Location: Brownsville, TX
Equipment: Leica Trimble RTK
Model No. Runner24 5700 / 5800

Personnel	Miles Becker	Scott Mcdonald						
Title:	Project Mgr	Snr Surveyor						

Time	Activity
8:00:00	Begin scouting for NGS monuments and river access points for launching vessels and monitoring water levels. Foul weather preventing set up of RTK base station. Found most NGS monuments, 2 boat ramps, and 6 good sites for monitoring water levels
13:30:00	Return to hotel due to foul weather.

Date 1/16/2008

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

Project: Rio Grande
Job No: **Vessel:** **Location:** Brownsville, TX
Equipment: Leica Trimble RTK
Model No. Runner24 5700 / 5800

Personnel	Miles Becker	Scott Mcdonald						
Title:	Project Mgr	Snr Surveyor						

Time	Activity
8:00:00	Pick up rebar, pvc & concrete for monumenting tide stations along river.
9:30:00	Set monument at RIO1
10:30:00	Set monument at RIO2
11:20:00	Set monument at RIO3
12:00:00	Set monument at RIO4
12:45:00	Set monument at RIO5
13:20:00	Set monument at RIO6
14:00:00	Set up RTK base station at AB0070
14:31:00	Check in on AB0058
14:45:00	Attemtp to measure RIO1 and RIO2. Weak radio signal. Unable to measure with current base.
16:02:00	Measure Monument at RIO3
16:14:00	Measure water level at RIO3
16:43:00	Measure monument at RIO4 (unable to measure water level due to high bank blocking signal)
17:08:00	Measure Monument at RIO5
17:13:00	Measure water level at RIO5
17:28:00	Check in on AB0067
17:44:00	Measure Monument at RIO6
17:48:00	Measure water level at RIO 6
18:15:00	Break down base station.
19:00:00	Arrive at hotel.

Date 1/17/2008

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

Project: Rio Grande
Job No:
Vessel:
Location: Brownsville, TX
Equipment: Leica Trimble RTK
Model No. Runner24 5700 / 5800

Personnel	Miles Becker	Scott Mcdonald						
Title:	Project Mgr	Snr Surveyor						

Time	Activity
8:30:00	Leave hotel. Set up base station at RIO3.
9:45:00	Check in at AB0058
10:10:00	Measure Monument at RIO2
10:14:00	Measure water level at RIO2
11:40:00	Measure Monument at RIO1
11:51:00	Measure water level at RIO1
12:25:00	Check in at AB0058
13:00:00	Break down base station.
13:15:00	Level from RIO3 to water.
13:30:00	Level from RIO2 to water.
13:45:00	Level from RIO1 to water.
14:15:00	Level from RIO4 to water.
14:35:00	Level from RIO5 to water.
15:00:00	Level from RIO6 to water.
16:00:00	Attempt to make contact with owners of boat ramps.
18:00:00	Return to hotel.

Date 1/18/2008

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

Project: Rio Grande
Job No:
Vessel:
Location: Brownsville, TX
Equipment: Leica
Trimble RTK
Model No. Runner24
5700 / 5800

Personnel	Miles Becker	Scott Mcdonald						
Title:	Project Mgr	Snr Surveyor						

Time	Activity
8:00:00	Pack gear in to truck.
8:30:00	Depart Brownsville for Houston.
14:45:00	Arrive at office in Houston. Unpack gear.

Date 2/20/2008

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

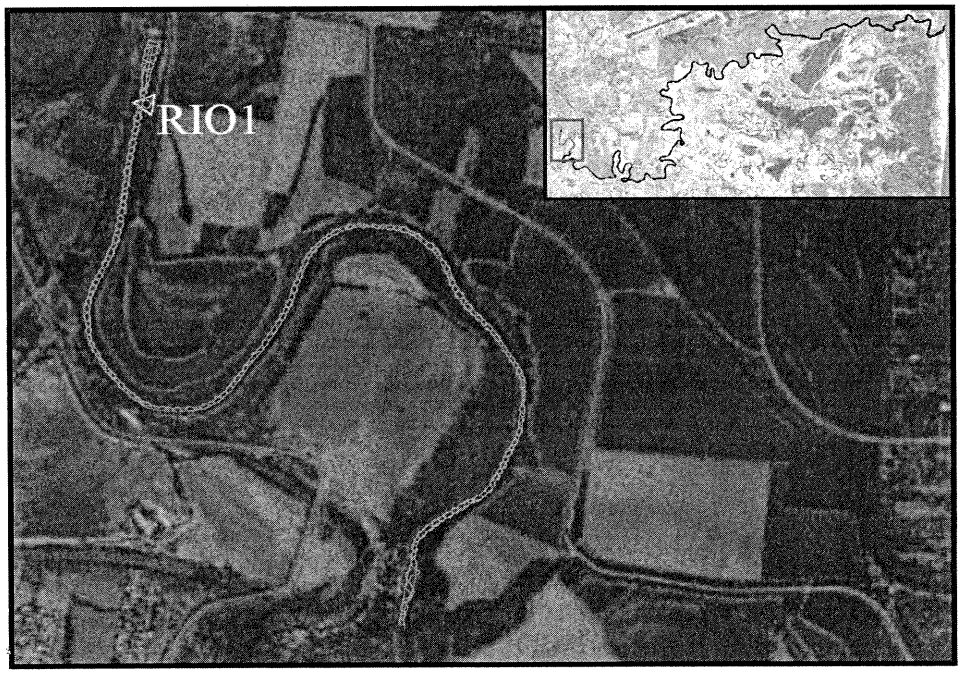
Project: Rio Grande
Job No:
Vessel: Skiff/Queen **Location:** Brownsville, TX
Equipment: Onset Leica
Model No. Hobo U20 Runner24

Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Time	Activity
8:00:00	Load all survey equipment into trucks.
8:30:00	Depart Houston with survey equipment and the skiff and "African Queen"
15:00:00	Arrive in Brownsville TX.
15:45:00	Launch tide gauge at RIO1 and level from RIO1 to water.
16:40:00	Lost a bearing cover on trailer. Purchase new part and repair.
17:00:00	Arrive at hotel.

Date	2/21/2008							
			Daily Log Sheet					
Project:	Rio Grande							
Job No:		**Vessel:**	Carolina Skiff	**Location:**	Brownsville, TX			
Equipment:	Trimble DSM	Odom	Odom	Onset	Leica			
Model No.	132	Hydrotrac CVM	Digibar	Hobo U20	Runner24			
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Time	Activity
6:30:00	Load survey equipment into truck and boat.
7:00:00	Depart hotel for boat ramp.
7:08:00	Stop for Ice and drinks
7:40:00	Stop at Loop Farms. Hand check to Jeff Loop for boat ramp fees.
8:00:00	Arrive at ramp near RIO3. Launch tide gauge at RIO3 and level from RIO3 to water.
	Load & test equipment on boat.
8:40:00	Launch boat. Run from RIO3 upstream to RIO2.
9:38:00	Arrive at RIO2. Launch tide gauge at RIO2 and level from RIO2 to water. Run from RIO2 to Section 1.
10:04:00	Arrive at downstream end of Section 1. Barcheck: Draft:0.9, Vel. Cast:4886
	Begin survey of Section 1. A lot of dense floating vegetation and debris in water (logs, tires, rubble, etc.)
	2 serpentine lines and 2 longitudinal lines run.
13:45:00	Section 1 complete. Barcheck. Run back to ramp at RIO3.
15:21:00	Arrive at Ramp. Pull boat. Disassemble equipment.
15:40:00	Refuel boat.
16:05:00	Arrive at hotel. Unload gear from boat and truck. Clean data.
6:30:00	Transfer data to FTP server.

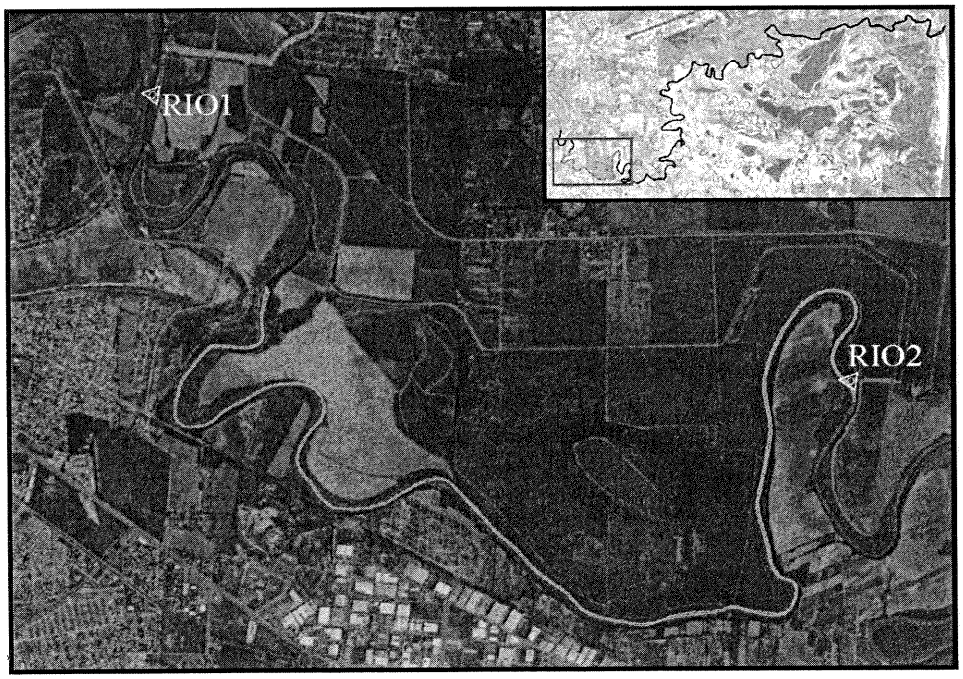


Date	2/22/2008							

Daily Log Sheet

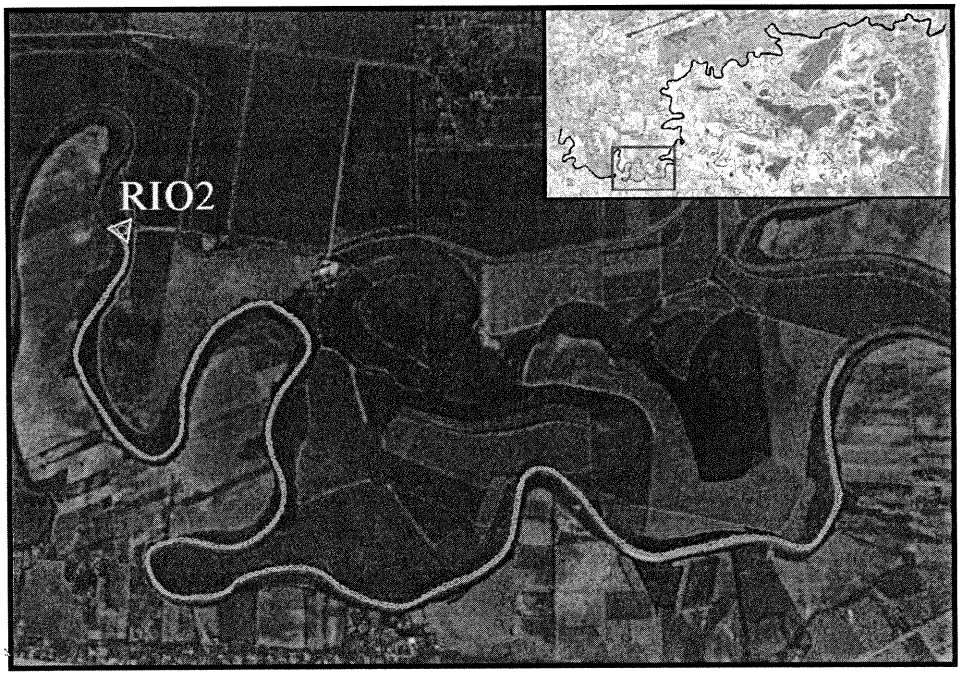
Project:	Rio Grande							
Job No:		**Vessel:**	Carolina Skiff	**Location:**	Brownsville, TX			
Equipment:	Trimble DSM	Odom	Odom	Onset	Leica			
Model No.	132	Hydrotrac CVM	Digibar	Hobo U20	Runner24			
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Time	Activity
6:00:00	Load survey equipment into truck and boat.
6:30:00	Depart hotel for boat ramp.
6:55:00	Arrive at ramp near RIO3. Load equipment in boat.
7:10:00	Launch boat. Run from ramp to Section 2.
7:42:00	Arrive at downstream end of Section 2. Assemble & test equipment.
7:45:00	Velocity cast: 4889, Barcheck, Draft: 0.9
8:03:00	Begin survey of Section 2.
10:00:00	Dead body found floating along bank. Contact Border Patrol with location. Instructed to standby until field agents arrive on site.
11:00:00	Border Patrol agents arrive. Continue with survey. 2 serpentine lines and 2 longitudinal lines run.
12:43:00	Survey stopped momentarily. Large grass carp jumps into boat, injures itself and bleeds profusely across the interior of the boat. Fish released back to river. Continue with survey.
15:55:00	Section 2 complete. Barcheck. Run back to ramp at RIO3.
16:34:00	Arrive at Ramp. Pull boat. Disassemble equipment.
17:15:00	Arrive at RIO1. Level from RIO1 to water and retrieve gauge.
17:40:00	Arrive at carwash. Rinse blood out of boat. Refuel boat.
18:15:00	Arrive at hotel. Transfer data to FTP server.



Date	2/23/2008							
			Daily Log Sheet					
Project:	Rio Grande							
Job No:		**Vessel:**	Carolina Skiff	**Location:**	Brownsville, TX			
Equipment:	Trimble DSM	Odom	Odom	Onset	Leica			
Model No.	132	Hydrotrac CVM	Digibar	Hobo U20	Runner24			
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Time	Activity
6:30:00	Load survey equipment into truck and boat.
6:45:00	Depart hotel for boat ramp.
7:04:00	Arrive at ramp near RIO3. Load equipment in boat.
7:30:00	Launch boat. Run from ramp to Section 3.
7:45:00	Arrive at downstream end of Section 3. Assemble & test equipment.
7:55:00	Velocity cast: 4934, Barcheck, Draft: 0.9
8:00:00	Begin survey of Section 3.
	2 serpentine lines and 3 longitudinal lines run.
15:50:00	Section 3 complete. Barcheck. Run back to ramp at RIO3.
16:45:00	Arrive at Ramp. Pull boat. Disassemble equipment.
17:15:00	Arrive at RIO4. Launch tide gauge and level from RIO4 to water.
17:35:00	Refuel boat
18:00:00	Arrive at hotel. Transfer data to FTP server.

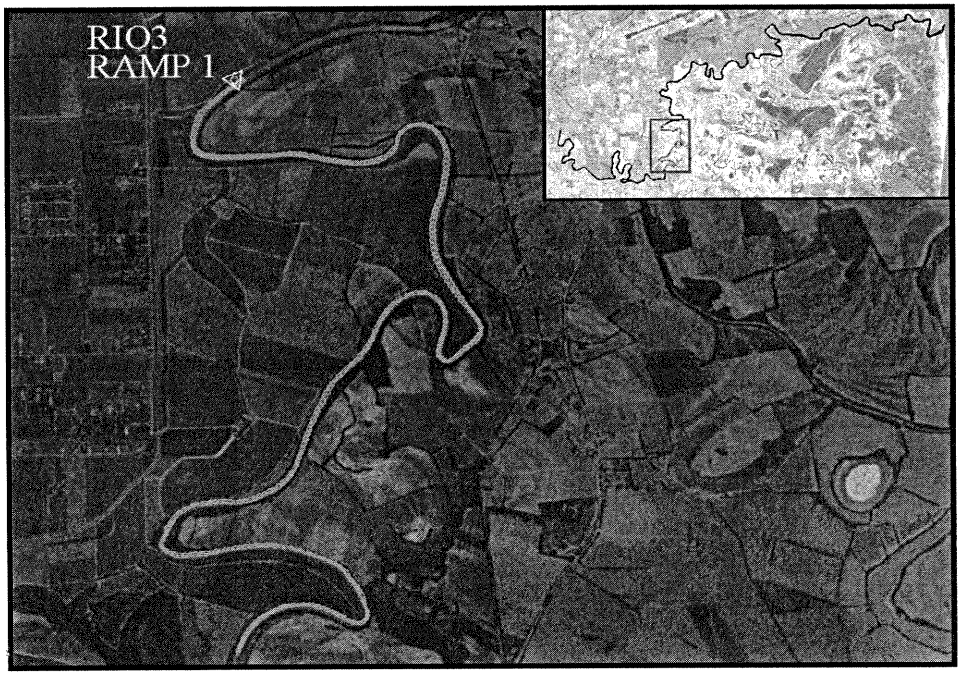


Date	2/24/2008							
Project:	Rio Grande							
Job No:		**Vessel:**	Carolina Skiff	**Location:**	Brownsville, TX			
Equipment:	Trimble DSM	Odom	Odom	Onset	Leica			
Model No.	132	Hydrotrac CVM	Digibar	Hobo U20	Runner24			
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Daily Log Sheet

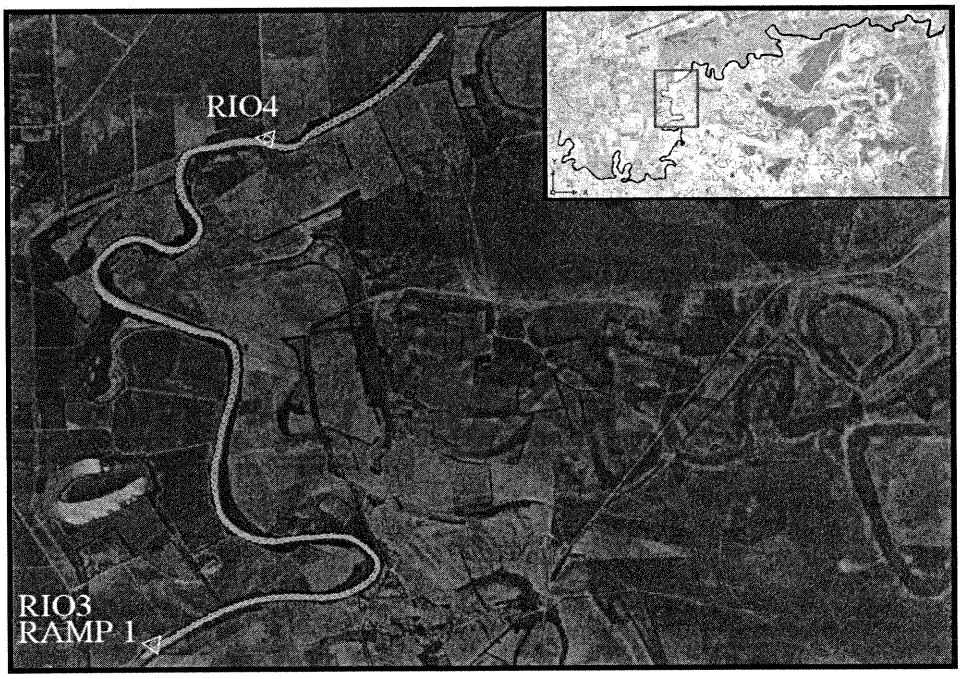
HYDROGRAPHIC CONSULTANTS

Time	Activity
6:30:00	Load survey equipment into truck and boat.
6:45:00	Depart hotel for boat ramp.
7:08:00	Arrive at ramp near RIO3. Load equipment in boat.
7:28:00	Launch boat. Assemble & test equipment.
7:49:00	Velocity cast: 4919, Barcheck, Draft: 0.9
7:55:00	Begin survey of Section 4.
	2 serpentine lines and 3 longitudinal lines run.
15:50:00	Section 4 complete. Barcheck. Run to RIO2.
16:20:00	Arrive at RIO2. Level from RIO2 to water. Retrieve gauge. Run back to ramp at RIO3.
17:00:00	Arrive at Ramp. Pull boat. Disassemble equipment.
17:28:00	Arrive at RIO5. Launch tide gauge at RIO5. Level from RIO5 to water.
18:10:00	Refuel boat.
18:34:00	Arrive at hotel. Unload Equipment. Process tide data.
19:20:00	Transfer data to FTP server.



Date	2/25/2008							
			Daily Log Sheet					
Project:	Rio Grande							
Job No:		**Vessel:**	Carolina Skiff	**Location:**	Brownsville, TX			
Equipment:	Trimble DSM	Odom	Odom	Onset	Leica			
Model No.	132	Hydrotrac CVM	Digibar	Hobo U20	Runner24			
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Time	Activity
6:30:00	Load survey equipment into truck and boat.
6:45:00	Depart hotel for boat ramp.
7:10:00	Arrive at ramp near RIO3. Load equipment in boat. Assemble & test equipment.
7:30:00	Launch boat.
7:35:00	Velocity cast: 4907, Barcheck, Draft: 0.9
7:40:00	Begin survey of Section 4.
	2 serpentine lines and 3 longitudinal lines run.
15:00:00	Section 5 complete. Barcheck. Run back to Ramp.
15:20:00	Arrive at Ramp. Pull boat. Disassemble equipment.
16:07:00	Arrive at hotel. Unload Equipment.
16:30:00	Transfer data to FTP server.



Date	2/26/2008							
Project:	Rio Grande							
Job No:		**Vessel:**	Carolina Skiff	**Location:**	Brownsville, TX			
Equipment:	Trimble DSM	Odom	Odom	Onset	Leica			
Model No.	132	Hydrotrac CVM	Digibar	Hobo U20	Runner24			
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

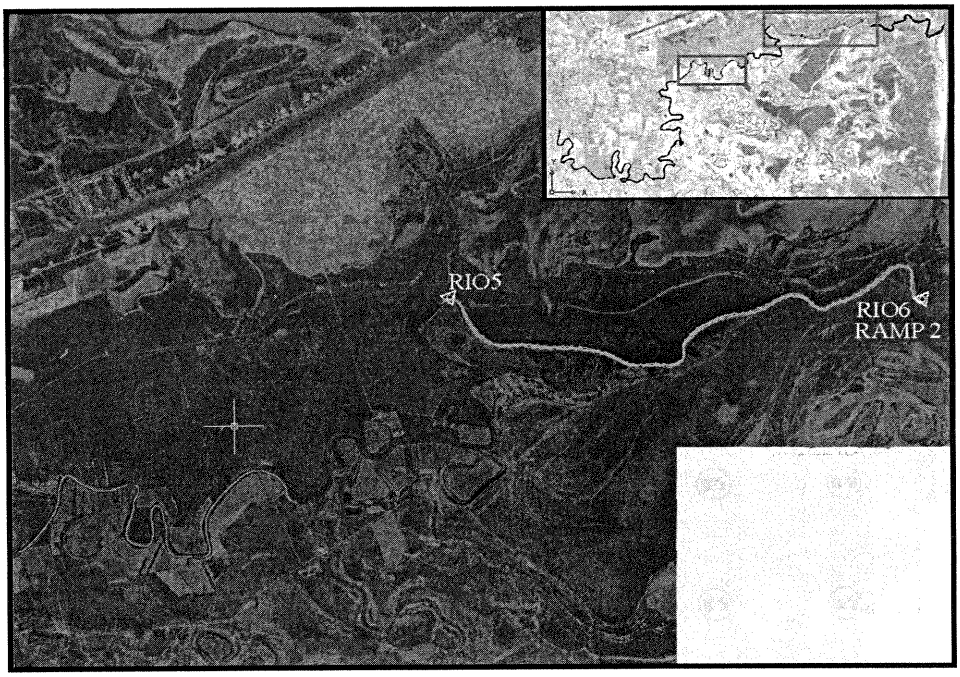
Time	Activity
6:00:00	Load survey equipment into truck and boat.
6:30:00	Depart hotel for boat ramp.
6:55:00	Arrive at ramp near RIO3. Load equipment in boat.
	Run to Section 6.
7:32:00	Arrive at upstream end of Section 6. Assemble equipment.
7:45:00	Velocity cast: 4902, Barcheck, Draft: 0.9
	Begin survey of Section 6.
	2 serpentine lines and 3 longitudinal lines run.
14:10:00	Lost lock on GPS Diff signal. Military helicopters suspect. Continue with last line hoping lock will return.
15:35:00	End of last line, Diff never locked. Barcheck, Draft: 0.9. Run back to ramp.
16:17:00	Arrive at Ramp. Pull boat. Disassemble equipment.
	Level from RIO3 to water. Retrieve gauge.
17:10:00	Arrive at RIO6. Launch tide gauge at RIO6. Level from RIO6 to water.
17:45:00	Refuel Boat.
18:15:00	Arrive at hotel. Lockup equipment in grey truck.
19:00:00	Transfer data to FTP server.

Date	2/27/2008							
Project:	Rio Grande							
Job No:		**Vessel:**	Afr. Queen	**Location:**	Brownsville, TX			
Equipment:	Trimble	Odom	Onset	Leica				
Model No.	NT300D	Hydrotrac	Hobo U20	Runner24				
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Daily Log Sheet

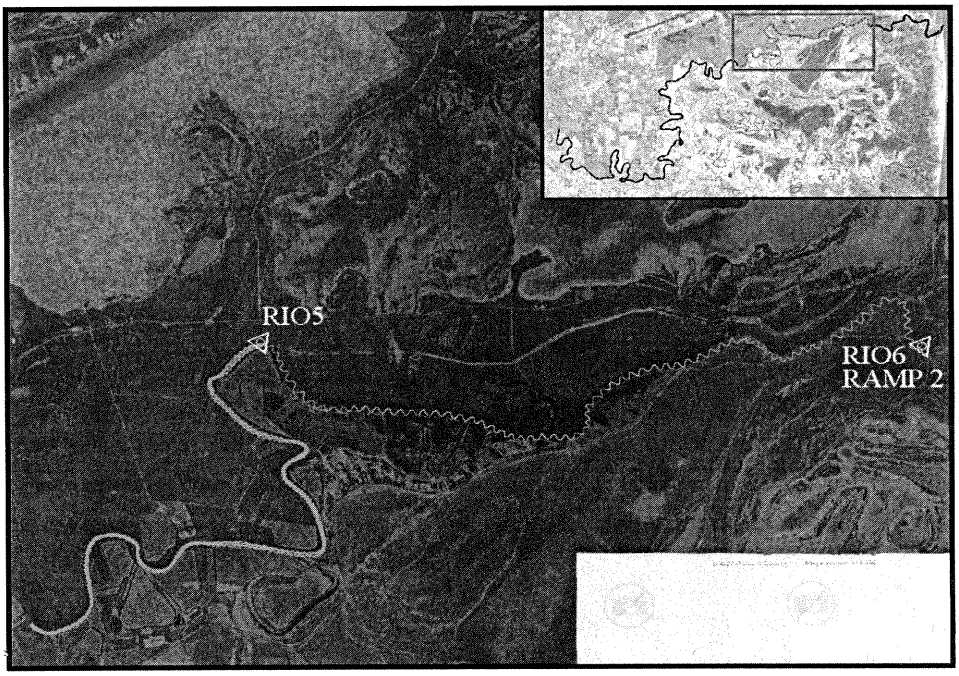
HYDROGRAPHIC CONSULTANTS

Time	Activity
6:30:00	Load survey equipment into truck and boat.
7:10:00	Depart hotel for boat ramp.
7:42:00	Arrive at ramp near RIO6. Load equipment in boat.
8:10:00	Launch boat. Run to Section 6.
8:57:00	Arrive at downstream end of Section 6. Assemble equipment.
	Barcheck, Draft: 0.2 Velocity: 4902
	Rerun centerline of Section 6 due to bad GPS positions on previous day.
10:00:00	Edgar Cano from Boarder patrol calls and requests that we move our truck/trailer for heavy equipment to repair ramp.
10:30:00	Centerline of Section 6 complete. Run back to ramp at RIO6 to move truck.
11:00:00	Arrive at Ramp. Move truck.
11:09:00	Begin surveying lines in Section 8.
	Only 1 serpentine line and 3 longitudinal lines run due to time lost moving truck. Will complete section tomorrow.
15:53:00	Barcheck
16:15:00	Pull boat. Disassemble equipment.
17:00:00	Refuel boat.
17:20:00	Arrive at hotel. Unload Equipment.
18:00:00	Transfer data to FTP server



Date	2/28/2008							
			Daily Log Sheet					
Project:	Rio Grande							
Job No:		**Vessel:**	Afr. Queen	**Location:**	Brownsville, TX			
Equipment:	Trimble	Odom	Onset	Leica				
Model No.	NT300D	Hydrotrac	Hobo U20	Runner24				
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Time	Activity
6:30:00	Load survey equipment into truck and boat.
6:45:00	Depart hotel for boat ramp.
7:25:00	Arrive at ramp near RIO6. Load equipment in boat.
7:32:00	Launch boat.
7:47:00	Barcheck, Draft: 0.3 Velocity: 4905
	Begin 2nd serpentine line in Section 8.
9:30:00	Complete serpentine line in Section 8. Begin lines in Section 7.
15:13:00	End of scroll. Barcheck
15:20:00	New Scroll. Barcheck. Continue with Section 7.
	2 serpentine lines and 3 longitudinal lines run.
16:03:00	Section 7 complete. Barcheck. Run back to ramp.
16:40:00	Arrive at ramp. Pull Boat. Disassemble equipment.
17:00:00	Refuel boat.
17:30:00	Arrive at hotel. Unload Equipment. Backup data.
18:30:00	Transfer data to FTP server.

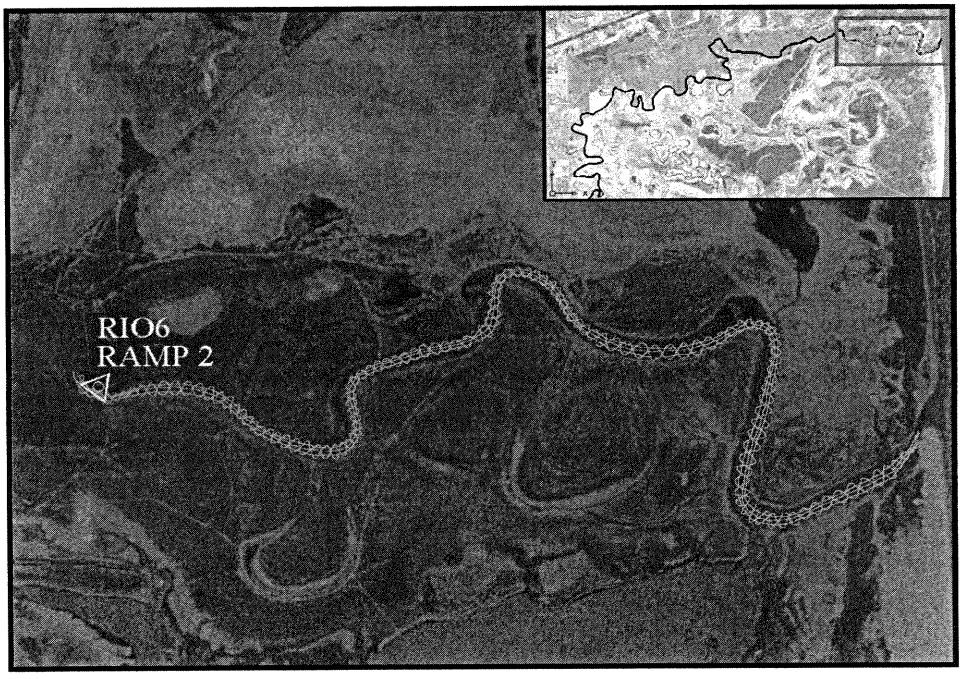


Date	2/29/2008							
Project:	Rio Grande							
Job No:		**Vessel:**	Afr. Queen	**Location:**	Brownsville, TX			
Equipment:	Trimble	Odom	Onset	Leica				
Model No.	NT300D	Hydrotrac	Hobo U20	Runner24				
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

Time	Activity
6:00:00	Load survey equipment into truck and boat.
6:25:00	Depart hotel for boat ramp.
6:55:00	Arrive at ramp near RIO6. Load equipment in boat.
7:20:00	Launch boat.
7:47:00	Barcheck, Draft: 0.3 Velocity: 4905
	Begin lines in Section 9.
	Difficult to get good soundings at mouth due to suspended sediment and aeration.
14:55:00	Section 9 complete. Run back to deeper water for barcheck.
15:16:00	Barcheck.
15:27:00	Pull boat. Disassemble gear.
16:16:00	Arrive at hotel. Unload Equipment. Create tide comparison charts. Backup data.
18:30:00	Transfer data to FTP server.



Date 3/1/2008

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

Project: Rio Grande
Job No: **Vessel:** **Location:** Brownsville, TX
Equipment: Onset Leica
Model No. Hobo U20 Runner24

Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Time	Activity
7:30:00	Load survey equipment into truck and boat.
7:52:00	Depart hotel.
8:32:00	Level from RIO6 to water. Retrieve gauge.
9:00:00	Level from RIO5 to water. Retrieve gauge.
9:25:00	Level from RIO4 to water. Retrieve gauge.
10:40:00	Arrive at hotel. Upload tidal data. Create tidal comparison charts.
12:30:00	Depart hotel to reset gauge at RIO1.
12:49:00	Arrive at RIO1. Level from RIO1 to water.
13:14:00	Depart RIO1.
13:30:00	Break for lunch.
13:56:00	Arrive at hotel. Continue processing tide data. Back up all data.
17:00:00	Transfer data to FTP server.

Date 3/2/2008

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

Project:	Rio Grande							
Job No:		**Vessel:**	Afr. Queen	**Location:**	Brownsville, TX			
Equipment:	Trimble	Odom	Onset	Leica				
Model No.	NT300D	Hydrotrac	Hobo U20	Runner24				
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Time	Activity
6:00:00	Load survey equipment into truck and boat.
6:30:00	Depart hotel.
6:48:00	Refuel Boat
7:20:00	Arrive at Ramp near RIO6. Load equipment into boat.
7:28:00	Launch boat. Run upriver to RIO2.
9:03:00	Arrive at RIO2. Launch gauge. Level from RIO2 to water.
9:23:00	Barcheck, Draft: 0.3 Velocity: 4905
	Begin survey of centerline through Section 1 and Section 2.
11:51:00	Centerlines complete.
12:03:00	Level from RIO1 to water. Retrieve gauge.
12:59:00	Barcheck, Draft: 0.3 Velocity: 4905
14:11:00	Arrive RIO2. Level from RIO2 to water. Retrieve gauge. Run back to ramp near RIO6.
16:00:00	Arrive at ramp. Pull Boat. Disassemble equipment.
16:45:00	Arrive at hotel. Unload equipment. Process data, tides and QC check
19:00:00	Organize & transfer all data to FTP server.

Date 3/3/2008

Daily Log Sheet

HYDROGRAPHIC CONSULTANTS

Project:	Rio Grande							
Job No:		**Vessel:**	Afr. Queen	**Location:**	Brownsville, TX			
Equipment:	Trimble	Odom	Onset	Leica				
Model No.	NT300D	Hydrotrac	Hobo U20	Runner24				
Personnel	Miles Becker	Scott Mcdonald	Chris Babitzke					
Title:	Project Mgr	Snr Surveyor	Boat Oper.					

Time	Activity
7:50:00	Load survey equipment into trucks and boats.
8:18:00	Depart Brownsville for Houston
14:45:00	Arrive at GBA office. Transfer equipment.
15:28:00	Arrive at HCL office. Unload boat and equipment.
16:00:00	Back up data.