Survey Report

(PO-178)

Bayou La Loutre Ridge and Marsh Creation Project

June 27, 2019

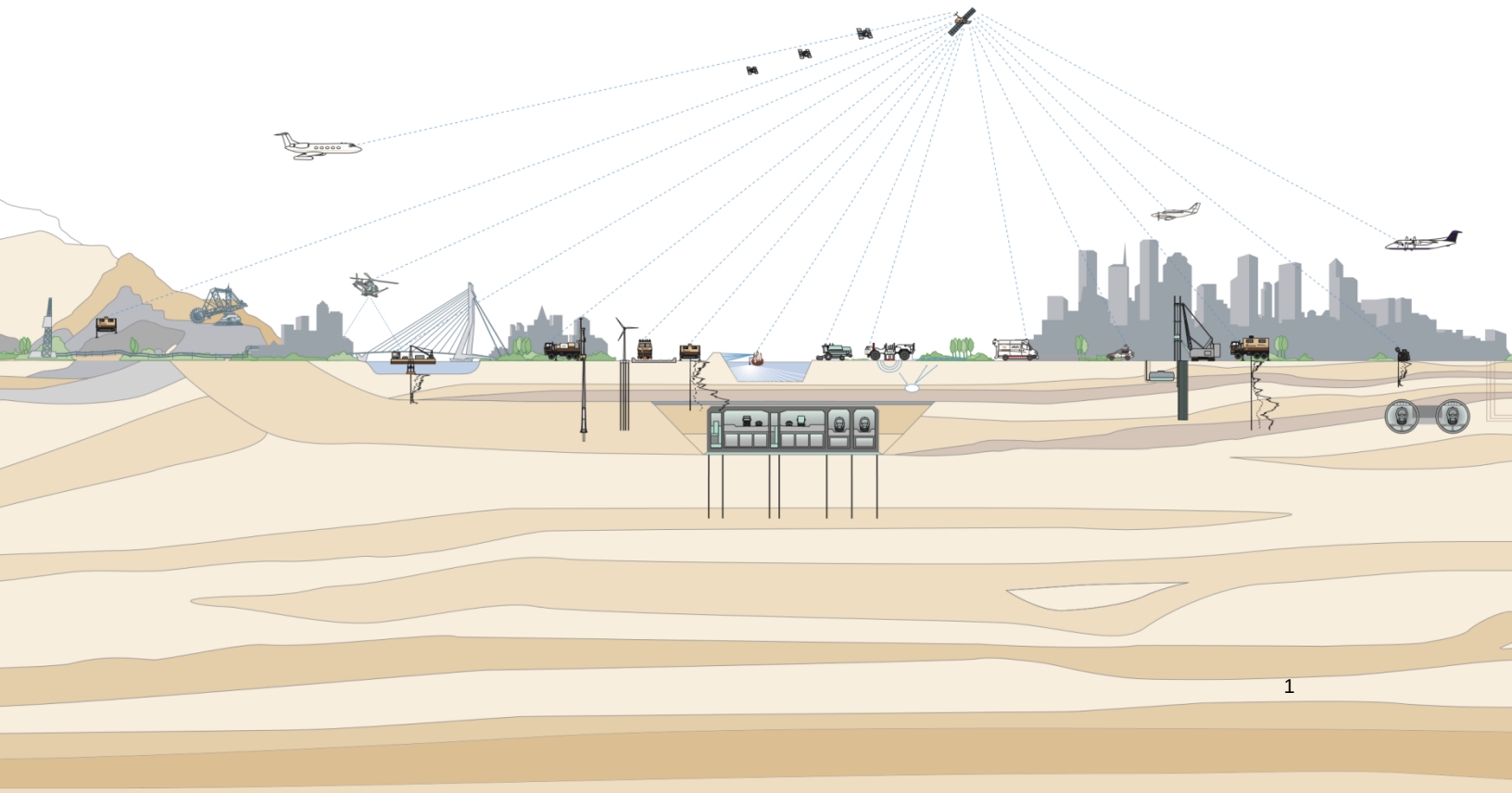
Submitted to:

Vida S. Carver, PE
Project Manager
Louisiana CPRA
150 Terrace Avenue
Baton Rouge, LA 70802

Submitted by:

Fugro USA Land, Inc.
226 Dulles Drive
Lafayette, Louisiana 70506

FUGRO PROJECT NO. 20190018



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1 COMPANY INFORMATION

Fugro is an internationally-acclaimed consulting firm that specializes in the provision of technical data and information required to design, construct, and maintain large structures and infrastructure in a safe, reliable, and efficient manner. We have been at the forefront of providing geospatial knowledge for over 50 years. Our complete geospatial approach assists our clients through the entire life span of a project: We begin with feasibility and continue through to post-construction and maintenance. Our comprehensive, integrated survey services have been used by a diverse set of industries including oil and gas, rail, electric utility, and government agencies. Access to Fugro's global resources allows us to deliver optimal solutions for projects of every scale.

Fugro is a global company with approximately 11,500 employees in about 60 countries, including an active office in Lafayette, Louisiana. Fugro Geospatial, Inc. is a wholly-owned subsidiary of Fugro NV, a Dutch corporation whose shares are publicly traded on the Amsterdam Mid-Cap Exchange. Throughout the world the multiple Fugro offices work as One Fugro to provide the most experience and best possible solutions for our clients. Fugro holds a strong market position due to in-house developed technologies, high value services, and a strong international and regional presence. Our highly-qualified specialists work with modern technologies and systems at locations all over the world.

Fugro provides registered, licensed Professional Land Surveyors throughout the Gulf Coast region. We provide a regulatory services group able to obtain necessary federal, state, and local permits. Fugro also offers hydrographic survey services for underwater projects such as oyster assessments, bathymetric hazard surveys, and coastal restoration projects. Furthermore, we provide high-precision FLI-MAP aerial LiDAR technology for linear projects such as rail, pipeline, and transmission line route surveys. As needed, 3D laser scanning services are also available.

2 PROJECT OVERVIEW

2.1 Project Purpose

The Bayou La Loutre Ridge Restoration & Marsh Creation Project (PO-178) is funded under the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) in Priority Project List 26. The Coastal Protection and Restoration Authority (CPRA), in partnership with Natural Resources Conservation Service (NRCS), have been authorized to execute Phase I (Engineering and Design) of PO-178. The objective of this project is to restore/create a ridge feature along Bayou La Loutre via bucket dredging and to create, maintain, and nourish existing deteriorating marsh between Bayou La Loutre and Lena Lagoon via hydraulic dredging.

Approximately 5.46 miles of ridge will be created along Bayou La Loutre with material mechanically dredged from the bayou. The total area of ridge anticipated to be created is approximately 31.7 acres, with 24.4 of those acres to be planted with Live Oak / Hackberry Maritime forest species. Approximately 163 acres of marsh will be created with an additional 258 acres nourished using borrow material dredged from Lake Borgne. Containment dikes will be constructed around most of the marsh creation area to retain sediment during pumping. The project would result in approximately 167 net acres of marsh and approximately 20 acres of forested ridge over the 20-year project life.

In support of this project, Fugro USA Land, Inc. (Fugro) provided conventional Real-Time Kinematic (RTK) topographic, and magnetometer surveys of the island and the associated near-shore areas. Field work commenced on February 25, 2019, and the data collection was completed on March 26, 2019. The following report details the methodology and results of the survey.

2.2 Project Location

The Bayou La Loutre Ridge and Marsh Creation Project is located in St. Bernard Parish near Hopedale, Louisiana.

Figure 1: Approximate survey location, near Hopedale LA.

3 SURVEY METHODOLOGY

3.1 Horizontal and Vertical Control

For horizontal control, Fugro used the North American Horizontal Datum of 1983 (NAD83), Louisiana State Plane Coordinate System, South Zone 1702. For vertical control, Fugro used the North American Vertical Datum of 1988 (NAVD88), Geoid12B. RTK GNSS surveying was positioned using the GULFNet Real Time Network (RTN). The data is reported in U.S. Survey Feet to two decimal places.

3.1.1 Coordinate System

Horizontal Datum	Vertical Datum	Geoid Model	Projection	Units
NAD83 (2011)	NAVD88	Geoid12B	State Plane Louisiana South	US Survey Feet

3.1.2 Monument

Prior to commencing RTK GNSS surveys, a check-in observation was completed at LCZ Monument "**CP RPM 5500**." The coordinates for this monument were verified during this survey, and are viewable in the data sheet located in Appendix B.

3.2 Magnetometer Survey

Fugro performed a magnetometer survey to identify the locations of ferrous debris and plausible pipelines that may impact future project operations within the survey area. Magnetometer data were collected using a Geometrics G-858 cesium-vapor magnetometer positioned with DGNSS. Proprietary Fugro MarineStar G2 DGNSS corrections were applied to all positioning data in real-time. All positioning and magnetometer data were recorded using the Hypack hydrographic and navigation software suite. A total of ~58 surveying line miles were collected across 133 navigation lines aboard an airboat.

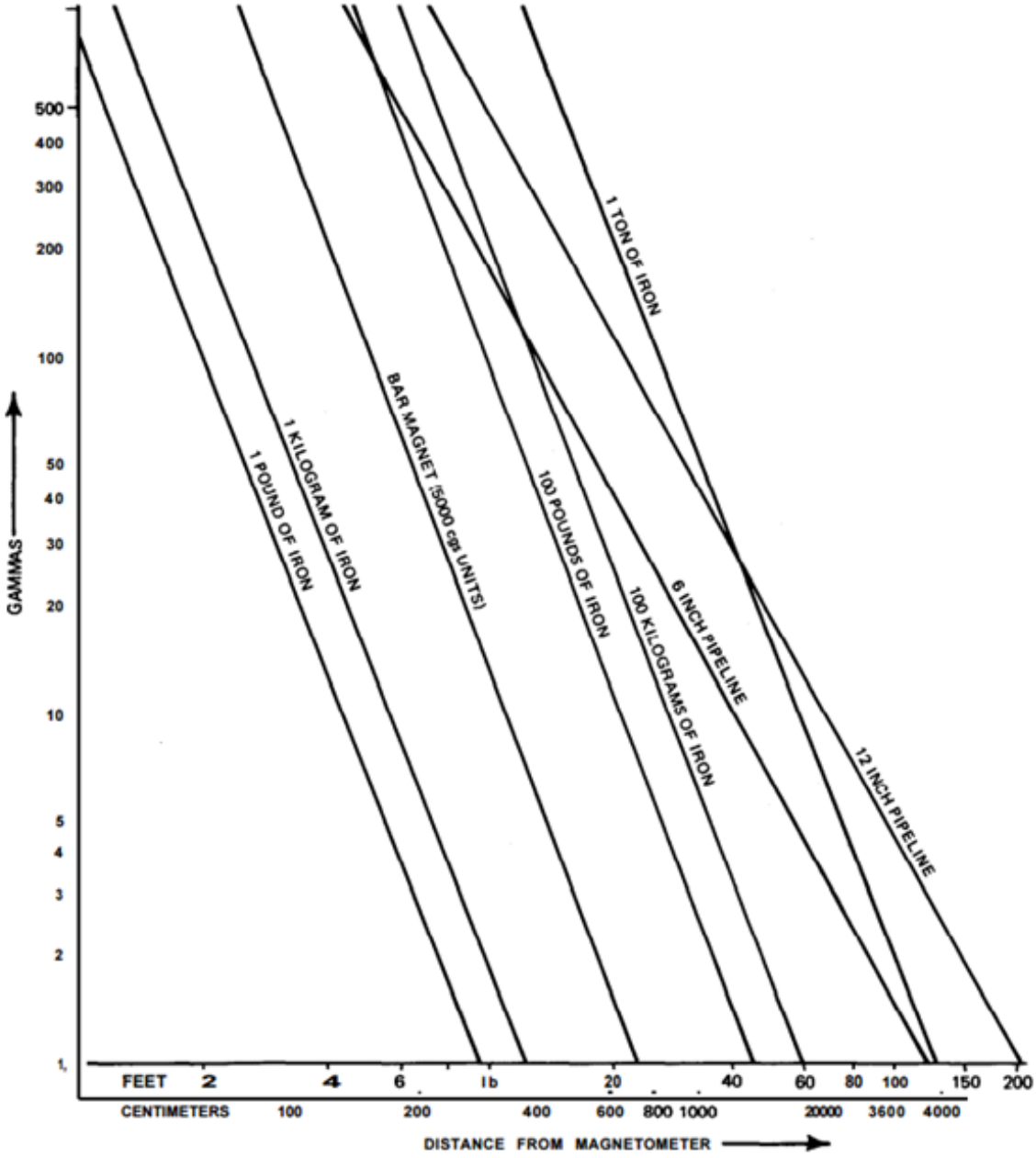
The magnetometer data was processed and interpreted using the SonarWiz geophysics software suite. Sensor offset values were applied to account for mounting configurations relative to the GNSS positioning antenna. The total magnetic field values recorded by the sensor were analyzed in two-dimensional profile view. Deflections from the ambient magnetic field within the survey area were interpreted as anomalies. Interpretations recorded the position, duration, and amplitude of each anomaly. The geometry of each anomaly was also described in terms of monopole or dipole. These descriptors refer to the geometry of the anomaly with respect to the ambient magnetic field. A monopole deviates from the ambient field in one polar direction, while a dipole deviates in either polar direction. These interpretations were then exported into digital files for mapping and archival purposes. Vessel track lines depicting the path of the sensor were also generated, and are viewable in Appendix A. The digital files were converted into the CIMS file format in accordance with the Scope of Work. A table was generated denoting the pertinent information for each magnetic anomaly and is viewable in Appendix A.

A total of 227 magnetic anomalies were identified and interpreted in the data set. Of these anomalies, one was confirmed to be associated with an existing dry hole in the survey area (Anomaly No. 16). Several other anomalies fall into groups or clusters such as 25-31, 35-42, 54-60, and 142-150. These anomalies are likely attributed to varying terrain creating artificial hits on the magnetometer. As the magnetometer sensor experiences vertical motion, it moves within the earth's magnetic field, and thus the ambient field strength changes. These subtle changes can produce artifacts within the data that look similar too anomalies produced by real ferrous objects. These artifacts are difficult to differentiate from actual anomalies and are therefore often interpreted as anomalies within the final dataset. The potential risk is often ruled out when other information is considered. The remaining anomalies are interpreted to be associated with isolated debris, or possible false-positives associated with the sensor encountering a sudden incline, such as found along steep channel banks. Area's with suspect magnetic anomalies were subject to a follow-on investigation involving a field crew walking and probing the site. The details of this follow-on investigation are presented in Section 3.3 of this report.

Based on the results of the magnetometer survey, along with the follow-on investigations, Fugro could find no evidence of petroleum transmission lines in the project area. The interpretation of possible pipelines is based on the presence of 1) a linear geographical distribution of magnetic anomalies exhibiting the amplitude expected for an object such as a pipeline, which also crossed all survey lines in a continuous linear pattern, 2) a permitted location of an existing pipeline as shown in either public or proprietary utilities databases, or 3) a combination of these variables. Public databases used in this interpretation included the National Pipeline Mapping System (NPMS) and the Louisiana Strategic Online Natural Resources Information System (SONRIS). Fugro's proprietary pipeline Geographic Information Systems (GIS) database was also used to support interpretations.

The differences observed in the interpreted anomalies within this report could be the result of several unique variables. The nomogram in Figure 3 provides a visual reference of the relationship between a ferrous object and the magnetic deflection generated by the object. The amplitude and signature width (duration) of a magnetic deflection are dependent on a variety of factors that include object size and orientation, ferrous content, and distance from the sensor (Breiner 1999). Due to the multitude of variables producing the interpreted anomalies, reliable conclusions drawn from magnetometer data alone can be limited. Extreme caution should always be taken when conducting operations near the locations of identified magnetic anomalies. A probing investigation is always recommended to accompany a magnetometer survey when anomalies are found in areas that will directly impact the project.

Figure 2: Photograph taken during the magnetometer survey depicting a large pile of metal debris outlined in red on bank. This pile of debris would introduce a significant anomaly in the magnetometer data. It is thought to be the source of Anomaly No. 139.



INSTRUCTIONS FOR USE:

To use the nomogram, select a given weight or type of object from among the diagonal labeled lines. Then choose a distance along the bottom line (abscissa) of the graph and follow a vertical line upwards from that distance until it intersects the diagonal line of the selected object. At that point, move horizontally to the left to a value on the vertical axis (ordinate) of the graph and read the intensity in gammas.

At a given distance, the intensity is proportional to the weight of the object. Therefore, for an object whose weight is not precisely that of the labeled lines, simply multiply the intensity in gammas by the ratio of the desired weight to the labeled weight on the graph. If the distance desired does not appear on the graph, remember that for a typical object the intensity is inversely proportional to the cube of the distance and for a long pipeline the intensity is inversely proportional to the square of the distance between magnetometer sensor and object. Due to the many uncertainties described herein, the estimates derived from this nomogram may be larger or smaller by a factor of 2 to 5 or perhaps more.

Figure 3: Nomogram taken from Brennan (1999).

3.3 Real-Time Kinematic (RTK) Topographic and Probing Investigation

A total of 9 topographic survey data points were collected between March 25 and March 26, 2019, in support of this project. Each day, the survey crew assembled an RTK GPS rover and connected to the GULFNet GPS Real Time Network (RTN). The crew then navigated to monument “CP RPM 5500” to complete a five-second check-in observation. The coordinates from this observation are then compared against those previously established for this control point. This quality control procedure served to verify that the system was operational and delivering corrected positions. This ensures that any observations recorded following this, would have the correct corresponding coordinates. This is simply a daily quality control measure Fugro completes.

Following the check-in observation, the crew navigated by airboat to areas of interest predetermined from magnetic anomalies seen in the mag data. On the northern shore face of Bayou La Loutre, the crew investigated mag anomalies along a permitted 6” pipeline route, which is visible in Appendix A. A permit from Manti Operating Company for the construction of this line was discovered in the SONRIS database during a desktop survey, however the permit was eventually withdrawn. The land crew performed an additional magnetometer investigation of this area and hand probed to confirm that the line was in fact never constructed. The magnetic anomalies initially observed are likely accredited to debris along the river bank or rough terrain appearing as noise on the magnetometer. The land crew additionally took RTK observations indicating the investigation of these anomalies.

Similarly, a potential pipeline observed in Appendix A was further investigated by the land crew. This line ran north to south crossing the project area. After further investigation by the land crew no evidence of an existing line was found in this area. The land crew again took several shots representing the investigation of this area.

Topographic data collected during the survey were uploaded to the Fugro database and Trimble Business Center for post-processing. The data were exported in a CSV digital file containing Point, Northing, Easting, Elevation, Description (PNEZD) information. These data were assembled into a table viewable in Appendix C. The data were also converted into CIMS format to be provided as a digital deliverable.

3.4 Equipment/Survey System(s)

3.4.1 HyPack Navigation and Acquisition Software

HYPACK, Inc. develops Windows-based software for the hydrographic and dredging industry and is one of the most successful worldwide providers of hydrographic and navigation software. HYPACK is one of the most widely used hydrographic surveying packages in the world, with over 4,000 users. It provides the surveyor with all of the tools needed to design their survey, collect data, process it, reduce it, and generate final products.

3.4.2 Trimble R8 RTK Surveying System

The Trimble R8 GNSS receiver delivers reliable, precise positioning in the most challenging surveying environments through the exploitation of the proprietary R-Track™ technology. This feature compensates for intermittent signal loss and enables extended precision operation throughout brief RTK correction signal interruption. The R8 receiver boasts a horizontal accuracy of 1 cm and a vertical accuracy of 2 cm when operating in kinematic mode.

3.4.3 Seatronics Schonstedt GAU-30 Magnetic Gradiometer

The GAU-30 is designed for expediting subaqueous search and salvage operations by enabling the location of ferrous objects. It employs a 50.5-inch titanium-cased sensor with a field range of +/- 70,000 gammas. The sensor can be hand-held, mounted on a non-magnetic pole, or dragged across the water bottom in a non-magnetic cage to facilitate detection depending on the application.

3.4.4 Geometrics G-858 Land Magnetometer

The G-858 is a cost-effective and compact land magnetometer with the performance of a Cesium Vapor sensor. This sensor facilitates the detection of ferrous hazards in support of utilities, environmental, petroleum and archeological surveys. The system is capable of sampling at a rate of up to 10Hz, enabling the user to quickly cover a large survey area without comprising sampling density. It is ruggedly engineered and never requires additional calibration once leaving the factory.

3.4.5 SonarWiz Geophysical Processing Software Suite

SonarWiz is a proprietary software suite produced by Chesapeake Technology purpose built for processing and analyzing sonar data. SonarWiz enables the user to import a variety of file types from different geophysical instruments. Processing features include gain manipulation, lay-back calculation, and a full suite of mapping tools.

4 QUALITY ASSURANCE

Fugro has a totally integrated Quality Assurance System that is documented, implemented, and under the control of a Quality Manager. Certification and compliance of this system to the ISO standards listed below verifies our commitment to meet customer needs by providing the proper policies, procedures, and resources. The Quality Assurance System is used to provide job control and promote optimal client communication during all stages of a project – from the initial proposal to final invoicing. Implementation of our Quality Assurance System assures compliance with all applicable regulatory and ecological requirements. For data management, the Fugro Quality System provides checks to validate and confirm that all survey data and processed data are interpreted and stored as required. The effectiveness of these business and operational processes are monitored, measured and analyzed as part of our compulsory quarterly Management Review of the Quality Assurance System which includes surveillance audits and certification renewal audits.

Fugro has qualified for and applied the following standards to our business and operational activities:

Quality Management System:
ISO 9001:2008
Certificate NO. UQA 4000406/AB
Approved by: Lloyd's Register Quality Assurance
Provision of Advanced Surveying, Mapping, Regulatory and Ecological Services for Land Applications and Airborne LIDAR data Collection and Interpretation

Environmental Management System:
ISO 14001:2004
Certificate NO. UQA 4000406/CB
Approved by: Lloyd's Register Quality Assurance
Provision of Advanced Surveying, Mapping, Regulatory and Ecological Services for Land Applications and Airborne LIDAR data Collection and Interpretation

Occupational Health & Safety Management System:
OHSAS 18001:2007
Certificate NO. UQA 4000406/BB
Approved by: Lloyd's Register Quality Assurance
Provision of Advanced Surveying, Mapping, Regulatory and Ecological Services for Land Applications and Airborne LIDAR data Collection and Interpretation

Fugro ensures that all surveys and documentation associated with this project is accurate and complied with accepted Industry Standards.

5 SAFETY

Fugro has developed and implemented an Occupational Health & Safety (OH&S) and Environmental Management System (EMS) to satisfy the needs of our customers, employees, shareholders, and community. We continually strive to improve our employee and company performance in the areas of health, safety, and protection of the environment. Fugro assures that ALL required safety equipment and gear including personal protective equipment (PPE) were utilized on this project.

Fugro also strives to prevent wasteful and inefficient operations, avoid damage to property and equipment, show respect for the environment, and, foremost, to protect the safety and well-being of all employees. Fugro employees received all safety training as specified in the contract.

The schedule of safety meetings and drills executed for this project included but were not limited to:

- Pre-job safety meetings;
- Pre-job vessel health, safety, and environmental orientation including man overboard, fire, and abandon ship drills;
- Daily tailgate safety meetings prior to each day's operations;
- When a new procedure or piece of equipment is introduced, including a written Job Safety Analysis; and
- Document a Near Miss accident or Injury.

Fugro ensures compliance with all applicable rules, regulations, orders, standards and interpretations promulgated under the Occupational Safety and Health Act (1997) and all other applicable laws, ordinances, rules, regulations and orders of anybody having jurisdiction over safety and health of persons or property or the protection of same to protect them from injury, illness, damage or loss. The Fugro Survey Project Manager or his designee conducted and documented a daily safety meeting at the beginning of each work day. A copy of the daily safety meeting minutes will be furnished upon request.

Fugro ensures that Personal Protective Equipment (PPE) will be utilized and maintained in accordance with the written PPE program. Training in the proper use, maintenance and inspection of PPE is provided to all Fugro employees prior to beginning work. Fugro will supply all required PPE required at the work site. Unless otherwise specified, the minimum PPE includes:

- Hard hats
- Safety glasses with side shields or side impact protection as necessary
- Safety toe shoes/boots (steel/composite toe or approved toe caps)
- Protective clothing with high visibility vest
- Task appropriate gloves

6 CONTACT INFORMATION

By use of these specific contact points, Fugro ensures quality control and prompt action with respect to all project-related issues.

Paul Laverty, PG, CH: For all corporate, legal, and contractual issues

Ryan Chapman, PLS: For all operational QA/QC issues from mobilization through final product delivery and for final project responsibility

FUGRO USA LAND, INC.			
Address	226 Dulles Drive Lafayette, LA 70506		
Manager Coastal Services	Paul Laverty	337.268.3133	p.laverty@fugro.com
General Manager Survey Operations	Ryan Chapman, PLS	337.354.4538	rchapman@fugro.com
Project Manager	Gregory Spiller	337.268.3336	g.spiller@fugro.com
Data Manager	Mark Spivey	337.268.3158	mspivey@fugro.com

7 REFERENCES

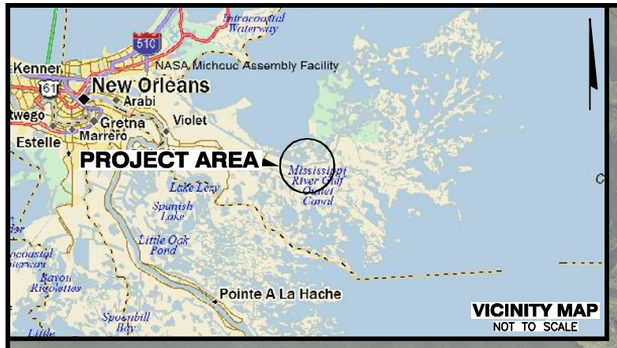
Breiner, S. "*Applications Manual for Portable Magnetometers.*" Geometrics. San Jose, CA. 1999

6-27-2019

RYAN H. CHAPMAN
PROFESSIONAL LAND SURVEYOR
LOUISIANA REGISTRATION NO. 5096

APPENDICES

APPENDIX A: DRAWINGS



LENA LAGOON

GRID NORTH

BAYOU LA LOUTRE

MISSISSIPPI RIVER GULF OUTLET

CP RPM 5500

PRELIMINARY
THIS DOCUMENT SHALL NOT BE RECORDED FOR ANY PURPOSE AND SHALL NOT BE USED OR VIEWED OR RELIED UPON AS A FINAL SURVEY DOCUMENT.

Proj. Mgr.: PHL
Revised:
Printed: 6/28/19

LEGEND:

- UPL — UNVERIFIED PIPELINE
- MAG SURVEY TRACKLINE
- PROPOSED MARSH CREATION BOUNDARY
- SURVEY MONUMENT

SURVEY MONUMENT: "CP RPM 5500"
NAD83
N= 483,441.87'
E= 3,826,357.62'

NAVD88 HEIGHT
ELEVATION = 6.87'

COASTAL PROTECTION AND RESTORATION AUTHORITY

EAST & WEST RIDGE & MARSH CREATION MAGNETOMETER SURVEY

BAYOU LA LOUTRE

ST. BERNARD PARISH, LOUISIANA

FUGRO USA LAND, INC.

GEODETIC DATUM: NAD83 PROJECTION: LOUISIANA SOUTH GRID UNITS: US SURVEY FEET		SCALE IN FEET 0 2,000'	
Job No.: 19-0018	Date: 6/28/19	Drwn: AXG	Chart: 1 Of: 5
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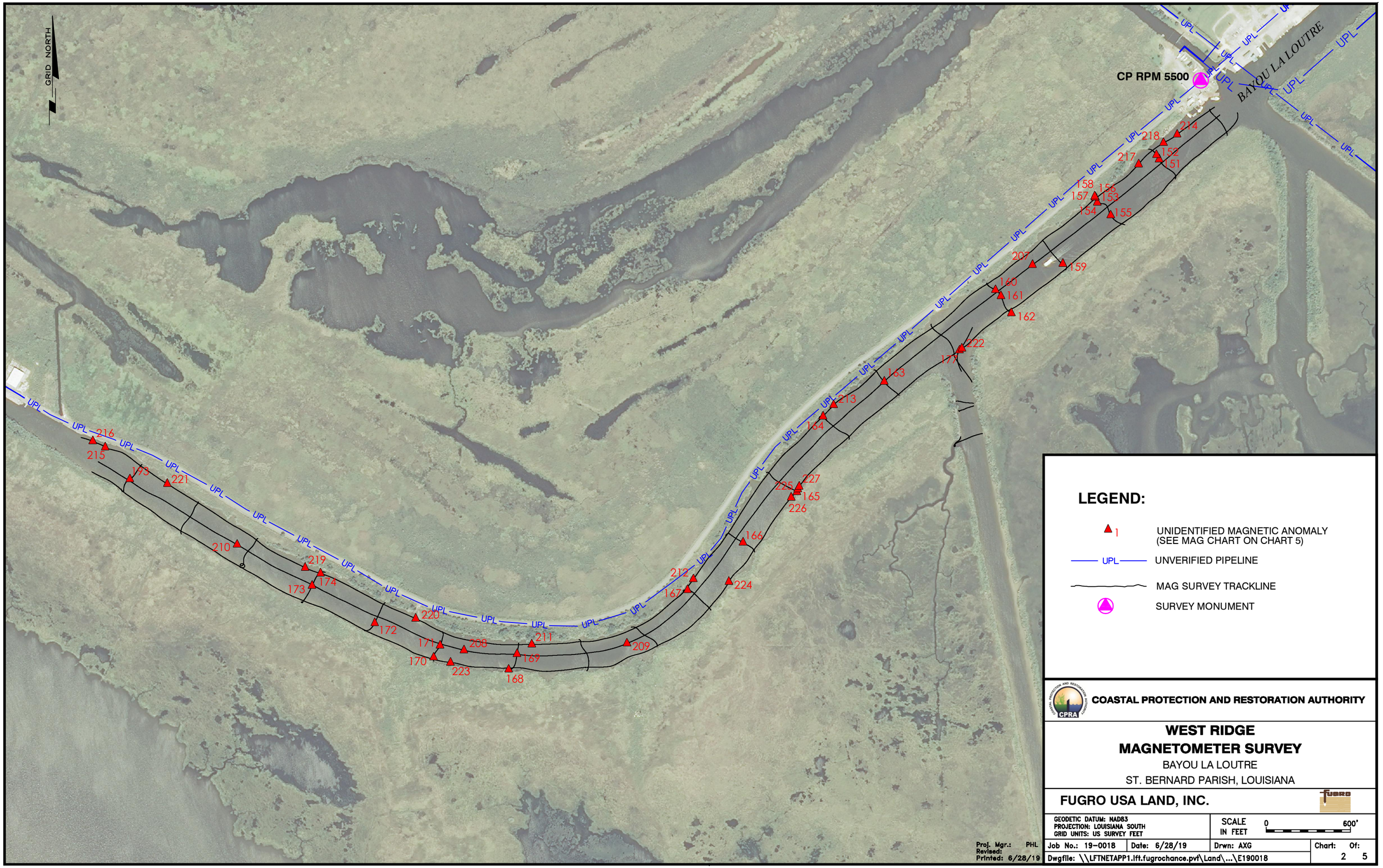

LEGEND:

- 1 — UNIDENTIFIED MAGNETIC ANOMALY (SEE MAG CHART ON CHART 5)
- UPL — UNVERIFIED PIPELINE
- MAG SURVEY TRACKLINE
- SURVEY MONUMENT

COASTAL PROTECTION AND RESTORATION AUTHORITY

WEST RIDGE
MAGNETOMETER SURVEY

BAYOU LA LOUTRE

ST. BERNARD PARISH, LOUISIANA

FUGRO USA LAND, INC.

GEODETIC DATUM: NAD83
PROJECTION: LOUISIANA SOUTH
GRID UNITS: US SURVEY FEET

SCALE IN FEET 0 600'

Job No.: 19-0018 | Date: 6/28/19 | Drwn: AXG | Chart: 2 Of: 5

Dwgfile: \\LFTNETAPP1.lft.fugrochance.pvt\Land\...\E190018

Proj. Mgr.: PHL
Revised:
Printed: 6/28/19

GRID NORTH

EXISTING DRY HOLE
X= 3,833,976.46'
Y= 492,715.24'

PROBE INVESTIGATION
(NOTHING FOUND)
X= 3,833,482.40'
Y= 492,543.00'

PROBE INVESTIGATION
(NOTHING FOUND)
X= 3,835,296.29'
Y= 491,187.03'

PROBE INVESTIGATION
(NOTHING FOUND)
X= 3,836,565.80'
Y= 490,238.26'

PROBE INVESTIGATION
(NOTHING FOUND)
X= 3,840,653.32'
Y= 491,092.12'

PROBE INVESTIGATION
(NOTHING FOUND)
X= 3,833,049.52'
Y= 488,983.32'

PROBE INVESTIGATION
(NOTHING FOUND)
X= 3,836,591.75'
Y= 490,179.31'

BAYOU LA LOUTRE

MISSISSIPPI RIVER GULF OUTLET

MATCHLINE

LEGEND:

1 — UNIDENTIFIED MAGNETIC ANOMALY (SEE MAG CHART ON CHART 5)

UPL — UNVERIFIED PIPELINE

MAG SURVEY TRACKLINE

COASTAL PROTECTION AND RESTORATION AUTHORITY

EAST RIDGE & MARSH CREATION MAGNETOMETER SURVEY

BAYOU LA LOUTRE

ST. BERNARD PARISH, LOUISIANA

FUGRO USA LAND, INC.

GEODETIC DATUM: NAD83
PROJECTION: LOUISIANA SOUTH
GRID UNITS: US SURVEY FEET

SCALE IN FEET 0 1000'

Proj. Mgr.: PHL
Revised:
Printed: 6/28/19

Job No.: 19-0018 | Date: 6/28/19 | Drwn: AXG | Chart: 3 Of: 5

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PROBE INVESTIGATION
(NOTHING FOUND)
X= 3,836,565.80'
Y= 490,238.26'

PROBE INVESTIGATION
(NOTHING FOUND)
X= 3,840,653.32'
Y= 491,092.12'

PROBE INVESTIGATION
(NOTHING FOUND)
X= 3,836,591.75'
Y= 490,179.31'

MATCHLINE

BAYOU LA LOUTRE

GRID NORTH

LEGEND:

- 1 — UNIDENTIFIED MAGNETIC ANOMALY (SEE MAG CHART ON CHART 5)
- UPL — UNVERIFIED PIPELINE
- MAG SURVEY TRACKLINE

Proj. Mgr.: PHL
Revised:
Printed: 6/28/19

COASTAL PROTECTION AND RESTORATION AUTHORITY

EAST RIDGE & MARSH CREATION
MAGNETOMETER SURVEY

BAYOU LA LOUTRE

ST. BERNARD PARISH, LOUISIANA

FUGRO USA LAND, INC.

GEODETIC DATUM: NAD83
PROJECTION: LOUISIANA SOUTH
GRID UNITS: US SURVEY FEET

SCALE IN FEET 0 1000'

Job No.: 19-0018	Date: 6/28/19	Drwn: AXG	Chart: 4 Of: 5

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APPENDIX B: MAGNETIC ANOMALY TABLE

MAGNETIC ANOMALY TABLE

(Louisiana South Coordinate System)

FUGRO

ANOMALY NO.	AMPLITUDE (GAMMAS)	DURATION (FEET)	ANOMALY SIGNATURE	LAT27	LON27	X-COORD (FEET)	Y-COORD (FEET)	LAT83	LON83	INTERPRETATION
1	76	72	MONOPOLE	29.831623	-89.591880	3,832,949	488,531	29.831828	-89.591937	UNIDENTIFIED
2	82	129	DIPOLE	29.832420	-89.592047	3,832,892	488,820	29.832625	-89.592103	UNIDENTIFIED
3	26	105	MONOPOLE	29.833111	-89.592297	3,832,809	489,070	29.833317	-89.592353	UNIDENTIFIED
4	25	92	MONOPOLE	29.832556	-89.592150	3,832,858	488,869	29.832761	-89.592207	UNIDENTIFIED
5	85	193	MONOPOLE	29.832813	-89.590537	3,833,368	488,970	29.833018	-89.590593	UNIDENTIFIED
6	39	15	MONOPOLE	29.833208	-89.589044	3,833,839	489,121	29.833414	-89.589101	UNIDENTIFIED
7	43	152	MONOPOLE	29.833009	-89.588960	3,833,867	489,049	29.833215	-89.589017	UNIDENTIFIED
8	76	273	MONOPOLE	29.835136	-89.589650	3,833,637	489,819	29.835342	-89.589706	UNIDENTIFIED
9	82	49	MONOPOLE	29.833035	-89.588962	3,833,866	489,058	29.833240	-89.589019	UNIDENTIFIED
10	30	87	MONOPOLE	29.840446	-89.591247	3,833,101	491,742	29.840652	-89.591304	UNIDENTIFIED
11	28	300	MONOPOLE	29.833222	-89.587386	3,834,365	489,134	29.833427	-89.587442	UNIDENTIFIED
12	36	45	MONOPOLE	29.833622	-89.587531	3,834,317	489,279	29.833827	-89.587587	UNIDENTIFIED
13	21	111	MONOPOLE	29.832790	-89.585683	3,834,907	488,985	29.832996	-89.585739	UNIDENTIFIED
14	32	24	MONOPOLE	29.833219	-89.585804	3,834,867	489,140	29.833424	-89.585861	UNIDENTIFIED
15	26	55	MONOPOLE	29.834030	-89.586137	3,834,757	489,434	29.834235	-89.586193	UNIDENTIFIED
16	43	382	MONOPOLE	29.842862	-89.588671	3,833,904	492,633	29.843067	-89.588728	Related to Dry Hole
17	29	121	MONOPOLE	29.838332	-89.602027	3,829,695	490,922	29.838538	-89.602084	UNIDENTIFIED
18	22	229	DIPOLE	29.837278	-89.601727	3,829,796	490,540	29.837483	-89.601784	UNIDENTIFIED
19	22	269	MONOPOLE	29.836552	-89.601451	3,829,888	490,277	29.836758	-89.601508	UNIDENTIFIED
20	20	194	MONOPOLE	29.837197	-89.598400	3,830,851	490,526	29.837402	-89.598456	UNIDENTIFIED
21	24	121	MONOPOLE	29.831862	-89.595172	3,831,904	488,602	29.832067	-89.595229	UNIDENTIFIED
22	9	147	MONOPOLE	29.832240	-89.593647	3,832,386	488,747	29.832446	-89.593703	UNIDENTIFIED
23	21	229	MONOPOLE	29.843744	-89.572616	3,838,989	493,032	29.843949	-89.572671	UNIDENTIFIED
24	51	86	MONOPOLE	29.847873	-89.577163	3,837,524	494,511	29.848078	-89.577219	UNIDENTIFIED
25	140	13	MONOPOLE	29.841333	-89.576842	3,837,663	492,134	29.841538	-89.576898	UNIDENTIFIED
26	160	7	MONOPOLE	29.842007	-89.576945	3,837,626	492,379	29.842212	-89.577001	UNIDENTIFIED
27	88	14	DIPOLE	29.842117	-89.577055	3,837,591	492,418	29.842322	-89.577111	Possible motion artifacts
28	116	12	MONOPOLE	29.840989	-89.576684	3,837,715	492,010	29.841194	-89.576740	Possible motion artifacts
29	102	6	MONOPOLE	29.840917	-89.576661	3,837,723	491,984	29.841123	-89.576716	Possible motion artifacts
30	78	11	MONOPOLE	29.840889	-89.576651	3,837,726	491,974	29.841094	-89.576707	Possible motion artifacts
31	227	13	MONOPOLE	29.840640	-89.576585	3,837,748	491,883	29.840845	-89.576641	Possible motion artifacts
32	137	10	MONOPOLE	29.840400	-89.568315	3,840,371	491,836	29.840605	-89.568371	UNIDENTIFIED
33	29	6	MONOPOLE	29.835533	-89.592947	3,832,589	489,947	29.835738	-89.593004	UNIDENTIFIED
34	54	10	MONOPOLE	29.835472	-89.592875	3,832,612	489,926	29.835677	-89.592932	UNIDENTIFIED
35	47	10	DIPOLE	29.833414	-89.598850	3,830,730	489,149	29.833620	-89.598906	Possible motion artifacts
36	82	13	DIPOLE	29.833301	-89.598822	3,830,739	489,108	29.833507	-89.598878	Possible motion artifacts
37	71	5	DIPOLE	29.833385	-89.598853	3,830,729	489,138	29.833591	-89.598909	Possible motion artifacts
38	129	9	DIPOLE	29.832961	-89.598711	3,830,776	488,984	29.833166	-89.598768	Possible motion artifacts
39	239	12	DIPOLE	29.832936	-89.598706	3,830,778	488,976	29.833142	-89.598763	Possible motion artifacts
40	89	10	MONOPOLE	29.833080	-89.598758	3,830,761	489,028	29.833286	-89.598815	Possible motion artifacts
41	149	5	MONOPOLE	29.833150	-89.598791	3,830,750	489,053	29.833356	-89.598847	Possible motion artifacts
42	43	10	MONOPOLE	29.833215	-89.598803	3,830,745	489,077	29.833421	-89.598860	Possible motion artifacts
43	100	10	MONOPOLE	29.836825	-89.550315	3,846,098	490,625	29.837030	-89.550370	UNIDENTIFIED
44	47	10	MONOPOLE	29.836849	-89.550324	3,846,094	490,634	29.837054	-89.550380	UNIDENTIFIED
45	42	3	MONOPOLE	29.836719	-89.550280	3,846,109	490,587	29.836925	-89.550336	UNIDENTIFIED
46	35	6	DIPOLE	29.836796	-89.550304	3,846,101	490,615	29.837001	-89.550360	UNIDENTIFIED
47	57	5	DIPOLE	29.837409	-89.550564	3,846,015	490,836	29.837614	-89.550620	UNIDENTIFIED
48	93	9	MONOPOLE	29.835876	-89.553552	3,845,077	490,264	29.836081	-89.553607	UNIDENTIFIED
49	84	4	DIPOLE	29.835833	-89.553535	3,845,082	490,248	29.836038	-89.553591	UNIDENTIFIED
50	29	12	MONOPOLE	29.835548	-89.553397	3,845,128	490,145	29.835753	-89.553452	UNIDENTIFIED
51	24	10	MONOPOLE	29.835584	-89.553412	3,845,123	490,158	29.835789	-89.553467	UNIDENTIFIED
52	213	4	MONOPOLE	29.835850	-89.553544	3,845,079	490,255	29.836055	-89.553599	UNIDENTIFIED
53	53	20	MONOPOLE	29.835853	-89.556610	3,844,107	490,240	29.836058	-89.556666	UNIDENTIFIED
54	216	9	DIPOLE	29.835288	-89.556435	3,844,166	490,036	29.835493	-89.556490	UNIDENTIFIED
55	70	10	DIPOLE	29.835162	-89.556469	3,844,156	489,990	29.835367	-89.556525	UNIDENTIFIED
56	21	11	MONOPOLE	29.835074	-89.556449	3,844,163	489,958	29.835279	-89.556504	UNIDENTIFIED
57	29	6	MONOPOLE	29.834854	-89.556415	3,844,175	489,878	29.835059	-89.556470	UNIDENTIFIED
58	20	17	MONOPOLE	29.834973	-89.556430	3,844,169	489,921	29.835178	-89.556486	UNIDENTIFIED
59	27	14	MONOPOLE	29.834878	-89.556415	3,844,174	489,887	29.835083	-89.556471	UNIDENTIFIED
60	134	8	MONOPOLE	29.835319	-89.556438	3,844,165	490,047	29.835524	-89.556494	UNIDENTIFIED
61	42	17	MONOPOLE	29.835067	-89.558110	3,843,636	489,947	29.835272	-89.558165	UNIDENTIFIED
62	33	11	MONOPOLE	29.835391	-89.559756	3,843,113	490,057	29.835596	-89.559811	UNIDENTIFIED
63	35	17	MONOPOLE	29.835241	-89.559589	3,843,166	490,003	29.835446	-89.559645	UNIDENTIFIED

MAGNETIC ANOMALY TABLE

(Louisiana South Coordinate System)

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ANOMALY NO.	AMPLITUDE (GAMMAS)	DURATION (FEET)	ANOMALY SIGNATURE	LAT27	LON27	X-COORD (FEET)	Y-COORD (FEET)	LAT83	LON83	INTERPRETATION
64	25	17	MONOPOLE	29.835191	-89.559580	3,843,169	489,985	29.835396	-89.559636	UNIDENTIFIED
65	102	7	MONOPOLE	29.834822	-89.559497	3,843,198	489,851	29.835027	-89.559552	UNIDENTIFIED
66	201	9	MONOPOLE	29.834800	-89.559486	3,843,202	489,844	29.835006	-89.559541	UNIDENTIFIED
67	41	17	MONOPOLE	29.834559	-89.559394	3,843,232	489,756	29.834764	-89.559449	UNIDENTIFIED
68	57	4	MONOPOLE	29.834778	-89.559475	3,843,205	489,836	29.834984	-89.559531	UNIDENTIFIED
69	50	3	MONOPOLE	29.834770	-89.559471	3,843,206	489,833	29.834975	-89.559526	UNIDENTIFIED
70	63	9	MONOPOLE	29.834385	-89.562456	3,842,262	489,678	29.834590	-89.562512	UNIDENTIFIED
71	121	2	MONOPOLE	29.834273	-89.562450	3,842,265	489,638	29.834479	-89.562506	UNIDENTIFIED
72	81	6	MONOPOLE	29.834326	-89.562449	3,842,265	489,657	29.834531	-89.562504	UNIDENTIFIED
73	95	3	DIPOLE	29.834297	-89.562445	3,842,266	489,646	29.834502	-89.562501	UNIDENTIFIED
74	60	10	MONOPOLE	29.833739	-89.564199	3,841,713	489,435	29.833944	-89.564254	UNIDENTIFIED
75	27	6	DIPOLE	29.834231	-89.564166	3,841,721	489,614	29.834436	-89.564222	UNIDENTIFIED
76	20	13	MONOPOLE	29.834309	-89.564174	3,841,718	489,642	29.834515	-89.564230	UNIDENTIFIED
77	81	6	MONOPOLE	29.833734	-89.564103	3,841,744	489,433	29.833939	-89.564159	UNIDENTIFIED
78	28	40	DIPOLE	29.834617	-89.564195	3,841,710	489,754	29.834822	-89.564250	UNIDENTIFIED
79	32	7	MONOPOLE	29.834142	-89.565792	3,841,206	489,573	29.834347	-89.565848	UNIDENTIFIED
80	22	6	MONOPOLE	29.834160	-89.565792	3,841,206	489,580	29.834365	-89.565847	UNIDENTIFIED
81	77	7	DIPOLE	29.834118	-89.565796	3,841,205	489,565	29.834324	-89.565851	UNIDENTIFIED
82	24	3	DIPOLE	29.834171	-89.567385	3,840,701	489,576	29.834376	-89.567441	UNIDENTIFIED
83	75	8	MONOPOLE	29.834075	-89.568959	3,840,202	489,534	29.834280	-89.569015	UNIDENTIFIED
84	200	114	MONOPOLE	29.834452	-89.569003	3,840,186	489,670	29.834657	-89.569059	UNIDENTIFIED
85	74	8	MONOPOLE	29.833798	-89.568967	3,840,201	489,433	29.834003	-89.569023	UNIDENTIFIED
86	54	24	MONOPOLE	29.833754	-89.572045	3,839,226	489,402	29.833959	-89.572101	UNIDENTIFIED
87	44	6	DIPOLE	29.834285	-89.572050	3,839,221	489,595	29.834490	-89.572105	UNIDENTIFIED
88	88	115	MONOPOLE	29.834575	-89.572080	3,839,210	489,700	29.834781	-89.572136	UNIDENTIFIED
89	85	8	DIPOLE	29.834251	-89.573695	3,838,700	489,574	29.834456	-89.573751	UNIDENTIFIED
90	52	12	MONOPOLE	29.833958	-89.573748	3,838,685	489,468	29.834163	-89.573804	UNIDENTIFIED
91	49	9	MONOPOLE	29.834289	-89.573689	3,838,701	489,588	29.834494	-89.573745	UNIDENTIFIED
92	46	10	MONOPOLE	29.834313	-89.573687	3,838,702	489,597	29.834518	-89.573743	UNIDENTIFIED
93	24	14	MONOPOLE	29.834439	-89.575198	3,838,222	489,635	29.834644	-89.575254	UNIDENTIFIED
94	103	7	MONOPOLE	29.834178	-89.576669	3,837,757	489,533	29.834383	-89.576725	UNIDENTIFIED
95	99	9	MONOPOLE	29.834201	-89.576670	3,837,757	489,542	29.834406	-89.576726	UNIDENTIFIED
96	54	10	DIPOLE	29.830705	-89.592866	3,832,642	488,192	29.830911	-89.592923	UNIDENTIFIED
97	64	21	DIPOLE	29.830927	-89.593130	3,832,557	488,272	29.831132	-89.593187	UNIDENTIFIED
98	99	10	MONOPOLE	29.829424	-89.593627	3,832,407	487,723	29.829630	-89.593684	UNIDENTIFIED
99	40	16	MONOPOLE	29.829633	-89.594328	3,832,184	487,796	29.829839	-89.594384	UNIDENTIFIED
100	41	18	MONOPOLE	29.829623	-89.594265	3,832,204	487,792	29.829828	-89.594322	UNIDENTIFIED
101	71	52	MONOPOLE	29.829379	-89.593521	3,832,441	487,707	29.829585	-89.593577	UNIDENTIFIED
102	36	6	MONOPOLE	29.827288	-89.595287	3,831,893	486,938	29.827494	-89.595344	UNIDENTIFIED
103	228	25	MONOPOLE	29.827812	-89.595612	3,831,787	487,127	29.828018	-89.595669	UNIDENTIFIED
104	25	12	MONOPOLE	29.827106	-89.595133	3,831,943	486,873	29.827311	-89.595190	UNIDENTIFIED
105	803	57	DIPOLE	29.827720	-89.595550	3,831,807	487,094	29.827926	-89.595607	UNIDENTIFIED
106	34	10	DIPOLE	29.827324	-89.595301	3,831,888	486,951	29.827529	-89.595358	UNIDENTIFIED
107	43	39	MONOPOLE	29.827229	-89.596930	3,831,372	486,909	29.827434	-89.596987	UNIDENTIFIED
108	38	35	MONOPOLE	29.827120	-89.596836	3,831,403	486,870	29.827325	-89.596893	UNIDENTIFIED
109	45	34	DIPOLE	29.825942	-89.597778	3,831,110	486,437	29.826148	-89.597835	UNIDENTIFIED
110	83	50	MONOPOLE	29.825883	-89.597528	3,831,190	486,417	29.826088	-89.597585	UNIDENTIFIED
111	48	11	MONOPOLE	29.825926	-89.598090	3,831,012	486,429	29.826131	-89.598147	UNIDENTIFIED
112	91	17	MONOPOLE	29.825924	-89.598150	3,830,993	486,429	29.826130	-89.598207	UNIDENTIFIED
113	128	26	MONOPOLE	29.826083	-89.597551	3,831,182	486,489	29.826289	-89.597608	UNIDENTIFIED
114	84	17	MONOPOLE	29.824756	-89.596885	3,831,400	486,010	29.824962	-89.596942	UNIDENTIFIED
115	29	42	MONOPOLE	29.824557	-89.597143	3,831,320	485,936	29.824763	-89.597199	UNIDENTIFIED
116	27	7	MONOPOLE	29.824856	-89.596836	3,831,415	486,047	29.825062	-89.596893	UNIDENTIFIED
117	35	7	MONOPOLE	29.824129	-89.595408	3,831,872	485,789	29.824335	-89.595464	UNIDENTIFIED
118	31	7	MONOPOLE	29.824359	-89.595235	3,831,926	485,874	29.824565	-89.595291	UNIDENTIFIED
119	52	12	MONOPOLE	29.824077	-89.595436	3,831,863	485,770	29.824283	-89.595493	UNIDENTIFIED
120	42	10	MONOPOLE	29.824319	-89.595265	3,831,916	485,859	29.824525	-89.595321	UNIDENTIFIED
121	76	9	MONOPOLE	29.848462	-89.575540	3,838,036	494,733	29.848667	-89.575595	UNIDENTIFIED
122	99	12	MONOPOLE	29.848922	-89.572787	3,838,906	494,914	29.849127	-89.572842	UNIDENTIFIED
123	58	9	MONOPOLE	29.848778	-89.574004	3,838,521	494,855	29.848983	-89.574060	UNIDENTIFIED
124	53	14	MONOPOLE	29.848770	-89.574041	3,838,509	494,852	29.848975	-89.574096	UNIDENTIFIED
125	113	11	MONOPOLE	29.848659	-89.574422	3,838,389	494,810	29.848864	-89.574478	UNIDENTIFIED
126	85	12	MONOPOLE	29.848551	-89.574812	3,838,266	494,769	29.848756	-89.574868	UNIDENTIFIED

MAGNETIC ANOMALY TABLE
(Louisiana South Coordinate System)

FUGRO

ANOMALY NO.	AMPLITUDE (GAMMAS)	DURATION (FEET)	ANOMALY SIGNATURE	LAT27	LON27	X-COORD (FEET)	Y-COORD (FEET)	LAT83	LON83	INTERPRETATION
127	90	12	MONOPOLE	29.848543	-89.574858	3,838,252	494,766	29.848748	-89.574913	UNIDENTIFIED
128	81	16	MONOPOLE	29.848422	-89.575752	3,837,969	494,717	29.848627	-89.575808	UNIDENTIFIED
129	119	16	DIPOLE	29.848316	-89.576019	3,837,885	494,677	29.848521	-89.576075	UNIDENTIFIED
130	131	18	DIPOLE	29.848399	-89.575801	3,837,953	494,709	29.848604	-89.575857	UNIDENTIFIED
131	364	19	MONOPOLE	29.841681	-89.592732	3,832,624	492,184	29.841887	-89.592788	UNIDENTIFIED
132	192	12	MONOPOLE	29.833425	-89.584230	3,835,364	489,223	29.833631	-89.584287	UNIDENTIFIED
133	63	6	MONOPOLE	29.834138	-89.584423	3,835,299	489,481	29.834344	-89.584479	UNIDENTIFIED
134	146	10	DIPOLE	29.833802	-89.581081	3,836,361	489,375	29.834007	-89.581138	UNIDENTIFIED
135	72	21	MONOPOLE	29.834890	-89.581287	3,836,289	489,770	29.835096	-89.581343	UNIDENTIFIED
136	165	6	DIPOLE	29.834621	-89.581330	3,836,277	489,672	29.834827	-89.581386	UNIDENTIFIED
137	101	10	MONOPOLE	29.833838	-89.581080	3,836,361	489,389	29.834044	-89.581136	UNIDENTIFIED
138	164	19	MONOPOLE	29.833578	-89.579423	3,836,888	489,302	29.833783	-89.579479	UNIDENTIFIED
139	438	341	MONOPOLE	29.835388	-89.580170	3,836,641	489,956	29.835593	-89.580226	Debris, possible wellhead
140	65	19	MONOPOLE	29.835874	-89.580381	3,836,571	490,132	29.836079	-89.580437	Debris, possible wellhead
141	32	6	DIPOLE	29.835970	-89.580358	3,836,578	490,167	29.836176	-89.580414	Debris, possible wellhead
142	57	21	MONOPOLE	29.842647	-89.567425	3,840,641	492,658	29.842852	-89.567480	UNIDENTIFIED
143	38	18	MONOPOLE	29.845532	-89.568295	3,840,349	493,702	29.845737	-89.568351	Possible motion artifacts
144	98	83	DIPOLE	29.846479	-89.568520	3,840,272	494,046	29.846684	-89.568575	Possible motion artifacts
145	41	19	DIPOLE	29.844586	-89.567982	3,840,453	493,360	29.844791	-89.568037	Possible motion artifacts
146	58	21	DIPOLE	29.844930	-89.568086	3,840,418	493,485	29.845135	-89.568142	Possible motion artifacts
147	74	13	MONOPOLE	29.842858	-89.567480	3,840,622	492,734	29.843063	-89.567536	Possible motion artifacts
148	68	19	MONOPOLE	29.845144	-89.568141	3,840,400	493,562	29.845349	-89.568196	Possible motion artifacts
149	43	30	MONOPOLE	29.840868	-89.566895	3,840,819	492,014	29.841073	-89.566951	Possible motion artifacts
150	56	25	MONOPOLE	29.844142	-89.567856	3,840,496	493,199	29.844347	-89.567912	Possible motion artifacts
151	131	55	MONOPOLE	29.816366	-89.613873	3,826,060	482,878	29.816572	-89.613931	UNIDENTIFIED
152	39	23	MONOPOLE	29.816454	-89.613931	3,826,041	482,910	29.816660	-89.613988	UNIDENTIFIED
153	29	6	MONOPOLE	29.815642	-89.615318	3,825,605	482,608	29.815848	-89.615376	UNIDENTIFIED
154	112	21	DIPOLE	29.815539	-89.615276	3,825,619	482,571	29.815746	-89.615334	UNIDENTIFIED
155	41	38	MONOPOLE	29.815285	-89.614978	3,825,715	482,480	29.815492	-89.615036	UNIDENTIFIED
156	30	3	MONOPOLE	29.815655	-89.615328	3,825,602	482,613	29.815862	-89.615385	UNIDENTIFIED
157	35	7	MONOPOLE	29.815640	-89.615325	3,825,603	482,607	29.815846	-89.615383	UNIDENTIFIED
158	42	2	MONOPOLE	29.815663	-89.615331	3,825,601	482,616	29.815869	-89.615389	UNIDENTIFIED
159	41	20	DIPOLE	29.814349	-89.616070	3,825,374	482,134	29.814555	-89.616127	UNIDENTIFIED
160	62	44	DIPOLE	29.813857	-89.617591	3,824,894	481,948	29.814063	-89.617648	UNIDENTIFIED
161	25	56	MONOPOLE	29.813737	-89.617471	3,824,933	481,905	29.813943	-89.617529	UNIDENTIFIED
162	19	8	MONOPOLE	29.813400	-89.617243	3,825,007	481,784	29.813606	-89.617301	UNIDENTIFIED
163	84	28	MONOPOLE	29.812092	-89.620120	3,824,102	481,295	29.812299	-89.620178	UNIDENTIFIED
164	87	6	MONOPOLE	29.811431	-89.621505	3,823,666	481,048	29.811638	-89.621563	UNIDENTIFIED
165	124	13	DIPOLE	29.809957	-89.622119	3,823,480	480,509	29.810163	-89.622176	UNIDENTIFIED
166	44	32	MONOPOLE	29.808983	-89.623344	3,823,097	480,149	29.809190	-89.623402	UNIDENTIFIED
167	42	18	DIPOLE	29.808072	-89.624606	3,822,701	479,812	29.808279	-89.624664	UNIDENTIFIED
168	49	11	MONOPOLE	29.806566	-89.628649	3,821,427	479,245	29.806772	-89.628707	UNIDENTIFIED
169	57	45	MONOPOLE	29.806867	-89.628457	3,821,486	479,355	29.807073	-89.628516	UNIDENTIFIED
170	45	6	MONOPOLE	29.806824	-89.630331	3,820,893	479,331	29.807030	-89.630389	UNIDENTIFIED
171	79	31	MONOPOLE	29.807054	-89.630181	3,820,939	479,415	29.807261	-89.630239	UNIDENTIFIED
172	52	46	MONOPOLE	29.807517	-89.631640	3,820,474	479,577	29.807723	-89.631698	UNIDENTIFIED
173	35	32	MONOPOLE	29.808262	-89.633035	3,820,027	479,841	29.808469	-89.633093	UNIDENTIFIED
174	50	7	MONOPOLE	29.808503	-89.632841	3,820,088	479,929	29.808709	-89.632899	UNIDENTIFIED
175	731	40	MONOPOLE	29.828128	-89.594929	3,832,002	487,246	29.828334	-89.594985	UNIDENTIFIED
176	106	41	DIPOLE	29.827900	-89.594827	3,832,035	487,163	29.828106	-89.594884	UNIDENTIFIED
177	336	97	DIPOLE	29.812685	-89.618420	3,824,638	481,518	29.812891	-89.618478	UNIDENTIFIED
178	24	167	MONOPOLE	29.836902	-89.576481	3,837,802	490,525	29.837107	-89.576537	UNIDENTIFIED
179	21	143	MONOPOLE	29.836358	-89.577243	3,837,563	490,323	29.836563	-89.577299	UNIDENTIFIED
180	2,847	167	MONOPOLE	29.830226	-89.600880	3,830,104	487,980	29.830432	-89.600937	Related to Dry Hole
181	26	131	MONOPOLE	29.831176	-89.601594	3,829,872	488,322	29.831382	-89.601651	UNIDENTIFIED
182	36	46	MONOPOLE	29.840414	-89.566858	3,840,833	491,849	29.840619	-89.566913	UNIDENTIFIED
183	29	57	MONOPOLE	29.840559	-89.566841	3,840,837	491,902	29.840764	-89.566896	UNIDENTIFIED
184	9	28	MONOPOLE	29.840487	-89.566842	3,840,838	491,875	29.840692	-89.566897	UNIDENTIFIED
185	23	48	MONOPOLE	29.841850	-89.567185	3,840,721	492,369	29.842055	-89.567241	UNIDENTIFIED
186	25	93	MONOPOLE	29.835388	-89.595438	3,831,800	489,883	29.835594	-89.595495	UNIDENTIFIED
187	32	87	MONOPOLE	29.836419	-89.597081	3,831,274	490,250	29.836625	-89.597137	UNIDENTIFIED
188	29	54	MONOPOLE	29.835207	-89.602656	3,829,513	489,782	29.835413	-89.602713	UNIDENTIFIED
189	122	218	MONOPOLE	29.843188	-89.573644	3,838,666	492,824	29.843393	-89.573699	UNIDENTIFIED

MAGNETIC ANOMALY TABLE

(Louisiana South Coordinate System)

FUGRO

ANOMALY NO.	AMPLITUDE (GAMMAS)	DURATION (FEET)	ANOMALY SIGNATURE	LAT27	LON27	X-COORD (FEET)	Y-COORD (FEET)	LAT83	LON83	INTERPRETATION
190	75	104	DIPOLE	29.836423	-89.603242	3,829,320	490,222	29.836629	-89.603299	UNIDENTIFIED
191	26	119	MONOPOLE	29.837390	-89.598987	3,830,664	490,594	29.837595	-89.599043	UNIDENTIFIED
192	39	37	MONOPOLE	29.838782	-89.593154	3,832,506	491,128	29.838987	-89.593211	UNIDENTIFIED
193	30	92	MONOPOLE	29.810403	-89.637091	3,818,730	480,601	29.810610	-89.637149	UNIDENTIFIED
194	33	40	MONOPOLE	29.824751	-89.596863	3,831,407	486,008	29.824957	-89.596920	UNIDENTIFIED
195	58	151	MONOPOLE	29.831762	-89.591578	3,833,044	488,583	29.831968	-89.591635	UNIDENTIFIED
196	26	443	MONOPOLE	29.829152	-89.593763	3,832,366	487,623	29.829358	-89.593819	UNIDENTIFIED
197	26	208	MONOPOLE	29.833420	-89.587036	3,834,475	489,208	29.833626	-89.587092	UNIDENTIFIED
198	63	441	MONOPOLE	29.827380	-89.596303	3,831,570	486,967	29.827586	-89.596359	UNIDENTIFIED
199	23	136	DIPOLE	29.838457	-89.547691	3,846,920	491,231	29.838662	-89.547746	UNIDENTIFIED
200	28	193	MONOPOLE	29.833296	-89.587570	3,834,306	489,160	29.833501	-89.587626	UNIDENTIFIED
201	521	538	MONOPOLE	29.829545	-89.594440	3,832,149	487,763	29.829751	-89.594496	UNIDENTIFIED
202	27	283	MONOPOLE	29.827581	-89.596478	3,831,514	487,039	29.827787	-89.596535	UNIDENTIFIED
203	21	546	MONOPOLE	29.834629	-89.580321	3,836,597	489,680	29.834834	-89.580377	UNIDENTIFIED
204	39	513	MONOPOLE	29.832746	-89.590685	3,833,322	488,945	29.832951	-89.590741	UNIDENTIFIED
205	35	276	MONOPOLE	29.828019	-89.595305	3,831,883	487,204	29.828225	-89.595362	UNIDENTIFIED
206	26	259	DIPOLE	29.838765	-89.547814	3,846,879	491,343	29.838970	-89.547869	UNIDENTIFIED
207	61	271	MONOPOLE	29.814338	-89.616751	3,825,158	482,127	29.814544	-89.616809	UNIDENTIFIED
208	56	197	MONOPOLE	29.806956	-89.629646	3,821,109	479,382	29.807163	-89.629704	UNIDENTIFIED
209	46	114	MONOPOLE	29.807043	-89.625983	3,822,270	479,431	29.807249	-89.626041	UNIDENTIFIED
210	61	173	MONOPOLE	29.809091	-89.634706	3,819,493	480,135	29.809298	-89.634764	UNIDENTIFIED
211	44	104	DIPOLE	29.807049	-89.628122	3,821,592	479,423	29.807256	-89.628180	UNIDENTIFIED
212	21	129	MONOPOLE	29.808282	-89.624471	3,822,743	479,889	29.808488	-89.624529	UNIDENTIFIED
213	41	137	DIPOLE	29.811650	-89.621264	3,823,742	481,128	29.811856	-89.621322	UNIDENTIFIED
214	244	112	DIPOLE	29.816848	-89.613459	3,826,188	483,056	29.817054	-89.613516	UNIDENTIFIED
215	339	129	MONOPOLE	29.811035	-89.637633	3,818,554	480,828	29.811242	-89.637692	UNIDENTIFIED
216	86	95	MONOPOLE	29.811159	-89.637910	3,818,466	480,871	29.811366	-89.637968	UNIDENTIFIED
217	54	186	MONOPOLE	29.816275	-89.614335	3,825,914	482,843	29.816481	-89.614393	UNIDENTIFIED
218	122	181	MONOPOLE	29.816688	-89.613769	3,826,091	482,996	29.816894	-89.613826	UNIDENTIFIED
219	41	170	MONOPOLE	29.808618	-89.633185	3,819,978	479,970	29.808824	-89.633243	UNIDENTIFIED
220	24	30	MONOPOLE	29.807589	-89.630719	3,820,765	479,607	29.807796	-89.630777	UNIDENTIFIED
221	21	60	MONOPOLE	29.810303	-89.636252	3,818,996	480,568	29.810509	-89.636311	UNIDENTIFIED
222	59	144	DIPOLE	29.812718	-89.618365	3,824,655	481,531	29.812925	-89.618423	UNIDENTIFIED
223	42	221	MONOPOLE	29.806720	-89.629954	3,821,013	479,295	29.806926	-89.630012	UNIDENTIFIED
224	27	211	MONOPOLE	29.808218	-89.623674	3,822,996	479,869	29.808425	-89.623732	UNIDENTIFIED
225	26	26	DIPOLE	29.810015	-89.622097	3,823,487	480,530	29.810222	-89.622154	UNIDENTIFIED
226	22	87	MONOPOLE	29.809852	-89.622247	3,823,440	480,470	29.810058	-89.622304	UNIDENTIFIED
227	34	37	MONOPOLE	29.810064	-89.622064	3,823,497	480,548	29.810270	-89.622122	UNIDENTIFIED

APPENDIX C: MONUMENT DATA SHEET

VICINITY MAP

1 inch = 3,000 feet

Reproduced from NAIP Louisiana 2013 1m Aerial Imagery

Station Name: "CP RPM 5500"

Location: The monument stamped "PO-24-SM-01" is located near Hopedale, Louisiana. From the intersection of LA Hwy. 46 and LA Hwy. 624 (Hopedale Hwy) near Yskloskey, LA, proceed east for approx. 5.4 miles to the station. The station is located on the left side of the road (northwest side), approximately 200' south of a concrete bridge over an unnamed canal and offset 8' from the edge of road.

Monument Description: Survey Cap attached to the top of a 10 foot rebar set flush with the ground.

Stamping: NA

Installation Date: 2014 **Date of Survey:** 3-May-14

Monument Established By: JCLS

NAD83 (2011) Epoch 2010.00 Geodetic Position

Lat: 29°49'05.19472"N
Long: 89°36'46.67116"W

NAD83 (2011) Epoch 2010.00 Datum LSZ (1702) Ft

N= 483,441.87
E= 3,826,357.62

Adjusted NAVD88 Height

Elevation = 6.87 feet (2.093 mtrs)

Ellipsoid Height (2011) = -23.514 mtrs.
Geoid12A Height = -25.608 mtrs.

FOR REFERENCE ONLY
LCZ Adjusted NAVD88 Height
Elevation (Geoid09)= N/A
Ellipsoid Height = N/A
Elevation (Geoid03)= N/A
Ellipsoid Height = N/A
Elevation (Geoid99)= N/A
Ellipsoid Height = N/A

Adjusted Position Established John Chance Land Surveys, Inc. for the Coastal Protection & Restoration Authority of Louisiana

APPENDIX D: RTK SURVEY TABLE

Point Number	Northing	Easting	Elevation	Description
1001	496493.56	3805326.72	3.72	QC CHECK
1002	483441.88	3826357.63	6.62	QC CHECK
1003	488983.32	3833049.52	0.88	PROBE INVESTIGATION
1004	490179.31	3836591.75	0.36	PROBE INVESTIGATION
1005	490238.26	3836565.80	0.52	PROBE INVESTIGATION
1006	491187.03	3835296.29	-2.06	PROBE INVESTIGATION
1007	492543.00	3833482.40	-0.04	PROBE INVESTIGATION
1008	492715.24	3833976.46	0.34	MAG HIT DRY HOLE 6FT WATER
1009	491092.12	3840653.32	1.25	PROBE INVESTIGATION
CP RPM 5500	483441.87	3826357.62	6.87	Capped Rebar
DJ9374	496469.32	3805525.60	1.18	DeepRod

APPENDIX E: FIELD NOTES

0600 loading truck
0645 @ ramp mobe boat
0710 fueling boat; no fuel in Hopedale
0800 rig mag
0945 launch
1030 re-rig mag sensor
1300 GPS cable broke review data lunch
1520 end survey

*HyPack offset where entered wrong due to change of setup. See Vessel log

J. Granger
R. Kiddy

2-26-19
(057)

CPRA
Bayou La Loutre mag Survey
Breton Sound, LA
20190018
04.107.1028

HyPack
DGPS
ORG-057-20190118
NAD 83 LA South Grid (FT)

0610 loading truck
0725 @ ramp mobe boat
0830 begin survey
1040 moved to Bayou transits due to low water in marsh
1525 end survey

J. Granger
R. Kiddy

2-27-19
(058)

CPRA
Bayou La Loutre Mag Survey
Breton Sound, LA
20190218
04.10781028

Hypack
DGPS
JRG-058_20190018
NAD 83 LA South Geoid 12B

0600 load truck
0705 @ launch
- laptop fail ; battery
- config new laptop
- troubleshoot GPS
1000 begin survey
1400 complete survey
1930 @ office

J. Granger
R. Kiddy

2-28-19
(059)

CPRA
Bayou La Loutre mag Survey
Breton Sound, LA
20FLCW18
04.10781028

HyPack
DGPS
JRG-059-20190018
NAD 83 LA South Geoid 12B

LD-4 265 MILES

0600 @ OFFICE
0640 DEPART
1040 ARRIVE @ BOAT LAUNCH
1200 IN ROUTE TO JOBSITE
1230 START SURVEY
1530 END
1600 DEPART DOCK
1700 ARRIVE @ HOTEL
1800 UPLOAD PAPERWORK / DATA

3/25/19
CLOUDY 68°

J. DEVILLIER
M. DEGLANDON
T. ORGERON

CPRA
BAYOU LALOUTRE PROBING INVESTIGATION
HOPEDALE, LA
ST. BERNARD PARISH
20190018

NAD 83 LA SOUTH
GEOID 12B

JBD_084_2019_20190018

1000 CHK (H. 0.059 V. 0.190) HZ= 2m

BASE @ PRS9906909 26741 (GULFNET)

N- 501341.870

E- 3806984.526

ELEV- 35.836

53

NO DATA COLLECTED

JCLS BOOK NO. 1200

54 LP-4 247 MILES

0600 MEET WITH CREW
0630 DEPART HOTEL
0730 ARRIVE @ DOCK
0800 START SURVEY
1200 END
1300 DEPART DOCK
1700 ARRIVE @ OFFICE
1800 UPLOAD PAPERWORK / DATA

3/26/19
CLOUDY 55°

I. DEVILLIER
M. DEGLANDON
T. ORGERON

CPRA
BAYOU LAFOURCHE PROBING INVESTIGATION
HOPEDALE, LA
ST. BERNARD PARISH
20190018 / 04.1078

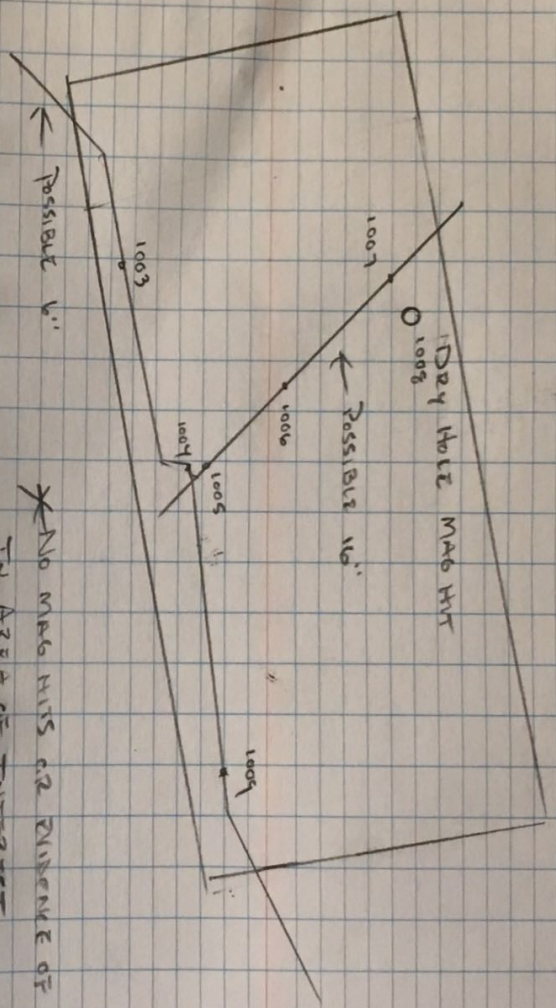
NAD 83 LA SOUTH
GEOID 12B

TBD_085_2019_20190018

ALL HZ = 2M

1006 MAG INVESTIGATION
1005 MAG HIT (DRY HOLE) 6 FT WATER
1004 " "
↑
1003 MAG INVESTIGATION
1002 CHK (H-0.006 V- 0.346) RPM 5500
1001 CHK (H-200.364 V. 2.537) DJ9374

BASE @ PRS9906909266741 (GNLFNET)
N- 501341.870
E- 3806984.526
ELEV- 35.836



NO MAG HITS OF RELEVANCE OF PILS IN AREA OF INTEREST

APPENDIX F: SCOPE OF WORK

STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY

SCOPE OF SERVICES FOR
MAGNETOMETER SURVEYS

BAYOU LA LOUTRE RIDGE AND MARSH CREATION PROJECT (PO-178)
ST. BERNARD PARISH, LA

JUNE 2018

1.0 INTRODUCTION

The Bayou La Loutre Ridge Restoration & Marsh Creation Project (PO-178) is funded under the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) in Priority Project List 26. The Coastal Protection and Restoration Authority (CPRA), in partnership with Natural Resources Conservation Service (NRCS), have been authorized to execute Phase I (Engineering and Design) of PO-178. The objective of this project is to restore/create a ridge feature along Bayou La Loutre via bucket dredging and to create, maintain, and nourish existing deteriorating marsh between Bayou La Loutre and Lena Lagoon via hydraulic dredging.

2.0 PROPOSED FEATURES

Approximately 5.46 miles of ridge will be created along Bayou La Loutre with material mechanically dredged from the bayou. The total area of ridge anticipated to be created is approximately 31.7 acres, with 24.4 of those acres to be planted with Live Oak / Hackberry Maritime forest species. Approximately 163 acres of marsh will be created with an additional 258 acres nourished using borrow material dredged from Lake Borgne. Containment dikes will be constructed around a majority of the marsh creation area to retain sediment during pumping.

3.0 LOCATION

The project is located in Region 1, Pontchartrain Basin, St. Bernard Parish. The marsh creation area is located east of the Mississippi River Gulf Outlet (MRGO) and north of Bayou La Loutre near the MRGO closure. The ridge feature is located along Bayou La Loutre, with approximately 9,581 feet west of the MRGO and 18,839 feet east of the MRGO. Approximate coordinates for the center of the project are 29° 50' 15"N and 89° 35' 27"W (NAD 83). A fact sheet and map showing the project location and features is included as **Appendix A**.

4.0 SCOPE OF WORK

The surveying firm, hereinafter referred to as "Contracting Party", shall perform magnetometer surveying for PO-178, as outlined in the following subsections.

4.1 Permission and Access

Louisiana Revised Statute Title 49, Subpart B (La.RS.49.214.6.9) grants CPRA the authority to enter private lands to conduct data collection efforts, provided that notice is sent to landowners whose property may be entered upon. Notice has been sent to all landowners who possess lands where data collection efforts will be taking place. However, as a courtesy, CPRA may choose to provide additional notification immediately prior to work, particularly during waterfowl hunting and alligator nesting seasons. For PO-178, numerous landowners were identified, making notification to all parties impractical. Landowners with the largest holdings are listed below and identified on the Landowner Map included as **Appendix B**. Notification to these landowners should be made a minimum of 48 hours prior to entry, if possible.

Blaise Pezold
The Mereaux Foundation
(504) 279-6559

Eric Zollinger
Biloxi Marshlands Corporation
(504) 837-4337

Shane Granier
Biloxi Wildlife Management Area
(504) 284-5264

Paul Hogan
Terre Au Boeufs Land Co.
(504) 552-4720

Gregory Rome
(504) 256-7335

Gary Albrecht
(504) 835-5103

4.2 Navigable Waterway Hazard Notification

The Contracting Party shall be responsible for notification and coordination with the U.S. Army Corps of Engineers (USACE) and any Levee Board agencies if the work to be performed under this scope of services is within the jurisdictional footprint that requires any such coordination. Additionally, if any work under this scope of services is expected to interfere with navigation, the Contracting Party shall be responsible for notification, coordination, and addressing with appropriate actions of all such potential navigational interferences with the USACE and the U.S. Coast Guard. CPRA shall be kept abreast of any relevant communications and courses of action and shall be provided a copy of all official written documentation.

4.3 Horizontal and Vertical Control

For horizontal control, the Contracting Party shall utilize the North American Horizontal Datum of 1983 (NAD83), Louisiana State Plane Coordinate System, South Zone 1702. For vertical control, the Contracting Party shall use the North American Vertical Datum of 1988 (NAVD88), Geoid12B. Field surveying shall be accomplished using GNSS or GPS RTK (real time kinematic) or an appropriate GNSS or GPS Real Time Network such as Gulfnet Virtual Realtime Network (VRS). The data shall be reported in U.S. Survey Feet to two decimal places.

The Contracting Party shall use the CP RPM 5500 monument that is part of the Louisiana Coastal Zone (LCZ) Secondary GPS Network. The designation and coordinates of applicable the monument is listed in **Table 1**. A data sheet is included in **Appendix C**.

Table 1: PO-178 Survey Monument

MONUMENT ID	NORTHING Adjusted NAD83 LSZ 1702 FT	EASTING Adjusted NAD83 LSZ 1702 FT	ELEVATION NAVD88, FT (Geoid 12A)
CP RPM 5500	3,826,357.62	483,441.86	6.87

4.4 Magnetometer Surveys

The Contracting Party shall perform a magnetometer survey in the project area to locate any pipelines or obstructions in the area. **Appendix D**, Sheets 3 and 4 – Magnetometer Layout, shows the location of each proposed magnetometer survey transect.

For each magnetic finding the Contracting Party shall record the intensity (gammas) and determine the source (e.g., pipeline, well, metal debris, etc.) of each finding. The Contracting Party shall also interpret the data and give its professional opinion of whether the hit will impact the proposed excavation. If a pipeline is detected, the Contracting Party shall probe to the pipeline and determine the depth of cover and the elevation of the top of the pipeline. Pipelines shall be probed at a minimum of every 100 ft. within the area of dredging/filling and a minimum of every 500 ft. within all adjacent areas of the project. Significant magnetometer hits and pipeline locations shall be shown in plan view on 11'' x 17" layout(s).

4.5 Aerial Photograph Overlay

All surveyed magnetometer lines shall be overlaid onto the latest available geo-rectified Digital Orthophoto Quarter Quadrangle (DOQQ) aerial photographs. The Contracting Party is responsible for obtaining any additional information needed to reference the surveys required by this scope to the aerial photograph

4.6 Preliminary Submittals

In addition to the deliverables requested in this scope of services, two sets of 11" x 17" preliminary drawings shall be delivered to Vida Carver, for technical review and comment before the remaining deliverables are finalized.

Please send all preliminary and final deliverables to the following address:

Vida Carver., P.E.
Coastal Protection and Restoration Authority
P.O. Box 44027
150 Terrace Avenue, 2nd Floor
Baton Rouge, LA 70802
(225) 342-2799
vida.carver@la.gov

5.0 ENGINEERING DELIVERABLES

5.1 One (1) set of draft survey drawings shall be submitted to CPRA via email in AutoCAD format for Acceptance before the survey report is finalized.

5.2 Two (2) bound hard copies of the final survey report, data, and drawings shall be submitted to CPRA after Acceptance of the draft survey drawings. Each spiral-bound report shall include one (1) digital copy of the final survey report (Adobe PDF), data (Microsoft Excel), and drawings (AutoCAD 2017 or later edition) on compact disk.

5.2.1 The survey report shall document the survey methodology employed in the field, survey control, calibrations, field equipment, field records, and all other pertinent information.

5.2.2 All data shall be provided in tables which include separate columns for point number, northing coordinate, easting coordinate, amplitude, duration, and description for the probable cause of each magnetic anomaly. Each individual transect shall be included in a separate Excel column and properly designated by transect number (i.e. M-01). Magnetometer survey data of all pipelines shall include a separate column for the elevation of the top of pipe.

5.2.3 The survey drawings shall conform to CPRA drafting standards, utilize half size (11"x17") borders, and include the following information:

5.2.3.1 Project name and number shall appear on all sheets;
5.2.3.2 All elevations shall reference NAVD88, Geoid 12B;
5.2.3.3 All horizontal coordinates shall reference the Louisiana State Plan Coordinate System South Zone 1702, NAD83;

5.2.3.4 Overlay all boundaries of project construction features in plan view;
5.2.3.5 The location of any secondary survey monuments or temporary benchmarks used, in plan view;
5.2.3.6 Magnetometer survey track lines and readings shall be shown in plan view;
5.2.3.7 Any spot elevations shall be shown or appropriately represented in plan view.

6.0 LASARD DELIVERABLES

6.1 LASARD Deliverables shall be submitted to CPRA electronically or on a compact disc in the data format following protocols defined in the LASARD SOP for acceptance before the survey report is finalized. **The deliverables and corresponding data reporting format outlined in this section is in addition to the deliverables and data reporting format outlined in section 5.0 Engineering Deliverables.** The Contractor shall obtain additional Attribute Specifications and LASARD GIS templates from Syed Khalil at 225-342-1641 or syed.khalil@la.gov.

LASARD Standard Operating Procedures:
Khalil, S. M., Haywood, E. and Forrest, B., 2015. Standard Operating Procedures for Geo-scientific Data Management, Louisiana Sand Resources Database (LASARD), Coastal Protection and Restoration Authority of Louisiana (CPRA), 30pp.
http://cims.coastal.louisiana.gov/RecordDetail.aspx?Root=0&sid=12362

6.2 One digital copy of the final LASARD deliverables shall be submitted to CPRA after acceptance of the draft LASARD deliverables on compact disc. The compact disc(s) shall include one (1) digital copy of the final LASARD deliverables as defined by the Attribute Specifications and LASARD GIS templates provided to the Contractor by CPRA.

6.0 CERTIFICATION

All deliverables shall be certified by a Professional Land Surveyor licensed by the State of Louisiana.