LOUISIANA DEPARTMENT OF NATURAL RESOURCES

SURVEY REPORT

LDNR Contract No: 2503-10-49 (TE-72)
PROJECT: LOST LAKE MARSH CREATION AND HYDROLOGIC RESTORATION
Terrebonne Parish, Louisiana

Pyburn & Odom Project No. 20-503

May 2011

Prepared for:

Louisiana Department of Natural Resources

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A. INTRODUCTION / BACKGROUND

This project consists of performing topographic, bathymetric, and magnetometer surveys in support of the Lost Lake Marsh Creation and Hydrologic Restoration Project, the objective of which is to create, maintain, and nourish existing deteriorating wetlands through dedicated dredging and hydrologic restoration. The project is located in Terrebonne Parish, Louisiana, southwest of the city of Houma, beginning in Bayou Decade near Lake Pagie and extending along the northern shoreline of Lost Lake as shown in Appendix A. The survey effort is intended to provide accurate, current information in support of planning and design efforts regarding the various aspects of the project. Proposed features of the project include the creation of approximately 465 acres of marsh situated between Lake Pagie and Bayou Decade, north of Bayou Decade, and along the northwestern shoreline of Lost Lake. Approximately 30,000 linear feet of terraces will be constructed to reduce fetch in areas of deteriorated marsh. Eight (8) water control structures are proposed to be replaced with variable-crest structures to increase freshwater flow into surrounding marshes. Six additional structures are to be evaluated for potential replacement.

See *Appendix A*, "Project Location Map", and "Site Layout Map".

B. METHODOLOGY

1. Horizontal & Vertical Control:

In accordance with the scope of work, our GPS Survey Team updated the horizontal and vertical position of existing furnished control station "TE 34 SM 04" (See Appendix B – Horizontal/Vertical) This was accomplished by two 5 hour static sessions on February 10 & 11, 2011 The results of the static observations were adjusted using NOAA 's Online Positioning User Service (OPUS). The results compared favorably (See below) with both the published position and Gulfnet Virtual Real Time Network (VRS) position. Where possible, Gulfnet VRS was utilized to control the RTK survey, however there were some areas where cell phone reception became an issue. In those areas, the updated (OPUS) position of "TE 34 SM 04" was held for the purpose of an established base station, with observations made to a second point (established with Gulfnet VRS) for a confidence check.

VERIFICATION OF TE 34 SM 04
Published Position : X=3389307.21 ; Y=313874.11 ; EL= 2.99
Feb 10 2011 Obs. : X=3389307.21 ; Y=313874.16 ; EL= 2.96
Feb 11 2011 Obs. : X=3389307.20 ; Y=313874.19 ; EL= 2.93 **(HELD)**

(See Appendix B – Horizontal/Vertical Control Information)

The horizontal alignment of the survey transects and magnetometer lines was taken from coordinates shown on drawings 6 and 7, furnished with the scope of work.

(Also refer to sheets 2-4 of the submitted drawing set)

2. Infrastructure for Four (4) Continuous Data Recorders:

The scope of work initially included directions to install and monitor continuous data collectors at 4 sites predetermined by the Dept. of Natrual Resources. During the pre-scope negotiations it was decided that Pyburn & Odom would only be required to build the supporting infrastructure for the sites, establish horizontal and vertical positions, and obtain measurements required on the "Continuous Recorder Water Level Sensor Data Sheet" for the posts at each location. It was determined that the Dept. of Natural Resources has adequate trained staff to perform the equipment installation and monitoring for the project. The Stations were constructed in accordance with guidelines as specified in the CRMS-Wetlands SOP Manual, Section 3.1.2.1. The locations and elevations on the benchmark nail are as follows:

Pnt# , Northing , Easting , El. , Description
15365, 312770.883, 3353631.210, 5.313, Nail at Data Collector 1
15261, 305905.989, 3355253.233, 6.029, Nail at Data Collector 2
15737, 322759.355, 3376912.423, 5.211, Nail at Data Collector 3
15407, 320684.213, 3376008.246, 6.166, Nail at Data Collector 4

(See also Appendix C "Continuous Recorder Water Level Sensor Data Sheets" and photos in this report)

3. Terracing and Marsh Creation Fill Area Surveys:

A total of 105 survey transects were established in accordance with the scope of work. The coordinates of the endpoints were taken from Sheet 6 of the furnished drawing set (Appendix B of the Scope of Work). The transects were spaced at 500 foot intervals throughout the terracing, marsh fill areas and borrow areas, with additional transects at other key areas (refer to sheet 2 of 68 of the delivered drawing set) The survey of the transects was accomplished using airboats to maneuver through marsh areas and cabin boats to navigate the hydrographic segments. An on-board computer with Hypack software was utilized to position the boats along the transects and acquire the requested survey interval. The Gulfnet VRS sytem was utilized to control both the vertical and horizontal positions obtained. Gulfnet VRS was integrated with Hypack software to accomplish real-time elevations, eliminating the need to further adjust the hydrographic data for tidal influences. The topographic and hydrographic data were edited and merged to assure no gaps of coverage. Other pertinent topographic features encountered within the project limits were surveyed as well and compiled into the overall cadd file. This included but was not limited to campsites, boat launches, utilities, rip rap limits and pipeline features. This level of detail is not presented in the hard-copy map set but is included in the overall base cadd file entitled "20-503 LOST LAKE 2K7.DWG" . See sheets 6-8 of the submitted drawing set for plan views of the surveyed transects

3. Borrow Area Surveys:

Surveys were performed within the borrow areas located in Lost Lake. The transects for the borrow areas were included within the total 105 transects described in the previous section. The survey was accomplished using a cabin boat equipped with an automated survey system incorporating a computer, GPS receiver, digital fathometer, and magnetometer, integrated with Hypack software. As indicated in the previous section, Gulfnet VRS was integrated with Hypack software to accomplish real-time elevations, eliminating the need to further adjust the hydrographic data for tidal influences. Magnetometer transects were surveyed through the borrow areas as well (See sheet 4 of 68 in submitted drawing set and Appendix F of this report). The magnetometer survey within the borrow areas resulted in no significant magnetic anomalies found.

4. Marsh Elevation Surveys:

Marsh elevation surveys were performed in the proximity of the data collector sites at the direction of LADNR representatives. The resultant survey points are included in the cadd base file “20-503 LOST LAKE 2K7.DWG”.

5. Structure Surveys:

Surveys were performed at 14 water control structures located within the Lost Lake project area. The existing structures were located using RTK methods. At each structure, cross sections were observed each side to show typical flow capacities. Plan/section sheets were created for each site as well as an overall location map and are included in the submitted drawing set (See sheets 54-68 of 68).

6. Magnetometer Surveys:

Magnetometer surveys were performed as indicated in the scope of work. The coordinates and transects for the magnetometer surveys are shown on sheets 3 and 4 (of 68) in the submitted drawing set. The survey was accomplished using an airboat (land/marsh areas) or cabin boat (hydro areas) equipped with an automated survey system incorporating an on-board computer, GPS receiver, and magnetometer integrated with Hypack software. The magnetometer was towed behind the survey vessel in a fiberglass kayak. The offset distance behind the vessel is accounted for within the hypack software positioning system. The initial magnetometer transects were surveyed and the information edited and reviewed in our home office. Our method of review allows us to view the data in a color coded plan view environment where the anomalies are differentiated from the typical non-magnetic areas. The software also has profile and spreadsheet views delinieating the deviation of magnetic frequenies.The areas where “hits” were observed were compiled and compared to information originally furnished with the scope of work (A cad file indicating general locations of pipe). These findings were also compared with the surveyed location of signs, markers, and probed locations (in the vicinity of signs and markers). We noted to LADNR some inconsistancies between the furnished information and our findings, upon which a new map (Exhibit “A”) was provided showing additional potential pipelines within the project limits. This map was scanned, and georeferenced into our cad file to prepare new navigation alignments for the magnetometer crew to trace out. The crews used these alignments to further pin-point (or rule out in some cases) the locations of the pipelines. It appears that the Exhibit “A” map was compiled by LADNR using a variety of sources with varying accuracies. Additional probing was accomplished with the results of the detailed magnetometer survey. The piplines were physically located at their intersection with the mag transects and at closer intervals where PI’s or bends were encountered. The results are shown in appendix F of this report and on plan sheet 5 of 68. For detailed information (magnetometer take off’s , signs, markers, well heads, platforms, and probed locations) refer to the submitted overall base cadd file entitled “20-503 LOST LAKE 2K7.DWG”.

7. **List of Appendixes:**

APPENDIX A: PROJECT LOCATION MAP & SITE LAYOUT MAP

APPENDIX B: HORIZONTAL & VERTICAL CONTROL INFORMATION

APPENDIX C: CONTINUOUS RECORDER DATA SHEETS & PHOTOS

APPENDIX D: PHOTOS AT (14) WATER CONTROL STRUCTURES

APPENDIX E: FURNISHED "Exhibit A" SHOWING POTENTIAL KNOWN PIPELINES

APPENDIX F: MAGNETOMETER TRACK LINES

APPENDIX G: MISC. SITE PHOTOS

APPENDIX H: COPIES OF SURVEY FIELD NOTES

APPENDIX I: DRAWINGS – SHEETS 1-68 of 68

C. DATA SUBMISSION.

1. Autocad (LDT) Drawing File(s): The survey data is compiled in an autocad base file, referenced as indicated in accordance with horizontal and vertical control methodology above. The base file "20-503 LOST LAKE 2K7.dwg" and all supporting files are included on the electronic submittal CD.

2. ASCII Point file(s) – in CSV (ascii) format, ordered as follows. Point Number, Northing (Y), Easting (X), Elevation, Description. The files are comma delimited and included in the electronic submittal CD.

3. Monument Control Sheet – Refer to This report, Section B Item 1, and Appendix B.

4. Field notes: The field notes are included with this report of survey (Appendix H) and digitally in PDF form. All supporting survey data will be organized and delivered on final CD.

5. Report of Survey: This report, in hard copy and PDF with all Appendixes (on CD). Appendixes "H" (Survey Field Notes) and "I" (Drawings – Sheets 1-68 of 68) are bound separate from this report.

D. CONTRACTOR INFORMATION.

This work was performed by Pyburn & Odom, Inc. as contracted to LDNR (Contract No. 2503-10-49__TE-71) under the direction of Mr. Richard Collins (P&O). Inquiries pertaining to this project can be made to Mr. Collins at 225-766-6330 or you may email at rcollins@pyodom.com . You will also find us on the Internet at www.pyodom.com

APPENDIX A

Project Location Map and Site Layout Map

APPENDIX B

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APPENDIX H

COPIES OF SURVEY FIELD NOTES

(bound under separate cover)

APPENDIX I

DRAWINGS – SHEETS 1-68 OF 68

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