Weston Solutions, Inc.
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Austin, Texas 78746
512-651-7100 · Fax 512-651-7101
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17 November 2010

Mr. Omar Valdez
Project Manager
Texas Commission on Environmental Quality
Remediation Division
12100 Park 35 Circle, Building D, MC 136
Austin, Texas 78753

RE: Letter Report – Geophysical Subsurface Investigation Activities and Results
Suspected Burial Site, Corpus Christi, Texas
W.O. No. 02444.019.005.0030

Dear Mr. Valdez:

Weston Solutions, Inc. (WESTON®) prepared this Letter Report to provide the results of geophysical subsurface investigation activities conducted on 14 October 2010 at the property located near the southeast corner of Manchester Avenue and Up River Road, Corpus Christi, Texas (Subject Property). Field activities were performed to evaluate the potential historical disposal of materials on the property.

This Letter Report describes the scope of work, investigation methods, and results. Attachments follow the text and are listed below.

- Attachment A – WESTON Field Notes
- Attachment B – Photographic Log
- Attachment C – Earth Measurement Corporation Summary Report

BACKGROUND

The Dona Park neighborhood is located between Interstate Highway 37 to the south and the former American Smelter and Refining Co. (ASARCO)/Encycle zinc smelting facility at 5500 Up River Rd to the north. Historical soil studies have been performed in the Dona Park neighborhood to assess the levels of lead, cadmium, and other metals that may have been historically transported from the ASARCO stack and deposited within the residential area. As a result of the investigations, affected soil was removed from several residential properties that contained metals concentrations above risk-based levels. Residents of the Dona Park neighborhood have recently expressed their concerns that affected soil may still be present. Specifically, concern has been expressed that subsurface waste material may exist at one of the properties within the Dona Park Neighborhood (Subject Property).

To address resident concerns, the Texas Commission on Environmental Quality (TCEQ) performed a non-intrusive ground-penetrating radar (GPR) and electromagnetic (EM) survey of

the Subject Property on 14 October 2010. The GPR/EM investigation allowed for the assessment of the possible subsurface materials at the property without the need for excavation. WESTON was contracted by the TCEQ to assist with the investigation and perform field oversight activities. WESTON contracted Earth Measurement Corporation (EMC) of Cypress, Texas to perform the GPR/EM survey. The location of the Subject Property is shown on Figure 1.

SURVEY IMPLEMENTATION

The GPR/EM survey was performed by a three-person EMC field crew on 14 October 2010. Personnel from WESTON and TCEQ were also present. Prior to initiating the survey, a 5-foot (ft) by 10-ft grid system was established, and the surface features of the property were mapped and recorded. A walking survey recorded the existence of visible surface features such as vegetation, debris, surface depressions, and pipeline markers.

Two non-intrusive geophysical methods were used to perform the study: GPR and EM. These methods have different advantages and limitations, and each can detect different features in the subsurface. The use of both of these methods in conjunction provided WESTON and EMC with additional data to support interpretations of the data collected. A description of each of these methods is provided below.

Ground-Penetrating Radar

The GPR survey was performed using a Geophysical Survey Systems, Inc. (GSSI) SIR 3000 System GPR utility cart unit with a 400-megahertz (MHz) antenna. Transects of the Subject Property were performed at 10-ft intervals in a north-south orientation. The SIR 3000 System is a multi-channel unit that automatically displays, processes, and records cross-sectional, variable color profiles of subsurface materials. The GPR method uses high frequency radio waves to acquire subsurface information. Short pulses of electromagnetic energy are radiated downward into the subsurface from a transmitting antenna. A portion of the energy is reflected back to a receiving antenna when encountering a layer or object of differing physical properties. A control unit continuously processes variations in the reflected signal that are graphically displayed on the onboard computer monitor. The amplitude and frequency of the reflected signal are caused by variations in electrical properties of subsurface materials. These variations result from the varying dielectric properties of the subsurface material and may indicate changing lithology, moisture content, salinity, and structure.

The ability of the GPR system to resolve subsurface targets depends on the physical size and relative electrical contrast of an object/feature with respect to the surrounding materials. Consequently, not every subsurface feature can be identified using the GPR method. Additionally, the nature of disturbed earth and fill material will increase signal attenuation with depth. The effective depth of penetration of the GPR with a 400 MHz antenna was limited to approximately 3 ft below ground surface (ft bgs) over most of the Subject Property.

Electromagnetic Equipment

The EM survey was performed using a Geonics Electromagnetic Meter, Model EM-61. Transects of the Subject Property were performed at 10-ft intervals in a north-south orientation. The EM meter uses electrical fields to detect subsurface ferrous objects (such as drums or pipelines). Objects with varying electrical characteristics determine the amplitude and velocity of the reflections of transmitted electromagnetic pulses. The depth of penetration for the EM survey was approximately 9 to 10 ft bgs at the Subject Property.

DATA PROCESSING

Upon completion of the GPR/EM survey, EMC utilized geotechnical analytical software to assess the survey results. The GPR data was post-processed using a processing software package from Geophysical Archaeometry Laboratory. EM data were contoured using Surfer9 by Golden Software. Maps showing the results of each of the surveys were generated by EMC and are contained in their summary report (Attachment C). An interpretive map, which combines both surveys and visual field observations, is also included in Attachment C.

SURVEY INTERPRETATION

The results of the walking field investigation support the likelihood that non-native materials are present at the Subject Property. Several areas containing concrete, rebar, and asphalt debris were noted at the surface. Surface depressions and variations in the topography were visible throughout the property. In addition, the area of investigation appears to be mounded, several feet higher in elevation than the surrounding land surface. This elevation difference does not appear to be native. Photographs of the Subject Property are provided in Attachment B.

A review of the GPR/EM survey results indicates the existence of several anomalous areas beneath the land surface. According to EMC's interpretation, one of these anomalies "has characteristics that indicate the presence of buried drums". The location of this anomaly is provided on the Interpretive Map within the EMC summary report. Three surface depressions (within the overall elevated area) that were noted during the walking survey overlie this anomaly. These depressions are presumably caused by compaction and subsidence of the disturbed soil over time. Two other ferrous anomalies that suggest potential subsurface materials are shown on the EMC maps.

Due to survey depth limitations, the pipelines crossing the property were not detectable by the GPR/EM instruments in the elevated area. However, the pipelines were detectable near Manchester Avenue using the EM equipment.

CONCLUSIONS AND RECOMMENDATIONS

The results of the walking survey and GPR/EM investigation indicate the presence of materials below the ground surface at the Subject Property. WESTON believes that sufficient evidence of subsurface materials has been obtained from this effort to support a subsurface investigation of the anomalous areas identified. Any materials encountered in the subsurface should be characterized ahead of disposal in accordance with applicable regulations.

CLOSING

If you have any questions about the contents of this Letter Report or require additional copies, please feel free to contact me at (512) 651-7122.

Very truly yours,

WESTON SOLUTIONS, INC.

Quintin K. McNulty, P.E.
Sr. Project Manager

Attachments

0 300 600

Feet

LEGEND

SUBJECT PROPERTY

N

SOURCE: (c)2009 Microsoft Corporation.

WESTON SOLUTIONS

FIGURE 1
SITE LOCATION MAP
ALLEGED DRUM BURIAL SITE
NORTHEAST CORNER OF
UP RIVER ROAD AND MANCHESTER AVE.
TCEQ
CORPUS CHRISTI, TEXAS

DATE	PROJECT NO	SCALE
OCTOBER 2010	02444.019.005.0030	AS SHOWN

FILE: I:\GIS Project Files\TCEQ (02444)\Dona Park\Site Location Map.mxd 10:54:01 AM 11/17/2010 thomasog

ATTACHMENT A
WESTON FIELD NOTES

CONTENTS

PAGE	REFERENCE	DATE

Location Dona Park, Corpus Christi, TX Date 10/14/10

Project / Client TCEQ Dona Park Investigation

02444-019-005

0748 Phil Bredfeldt (Westar) onsite at Up River Rd and Manchester Ave. Waiting arrival of John Barron (Alamo) and Omar Valdez (TCEQ)

0812 John Barron (Alamo) onsite. Begins to unload tractor and shredder at northwest corner of Up River Rd. and Manchester. Omar Valdez onsite

0853 Health & Safety meeting performed. Discuss rule to hospital; slip/trips/falls and biological hazards are present today. Today's SOW includes a site walking survey, vegetation cutting, and a ground penetrating radar survey. Weather will be hot; ~90°F and sunny

0919 John Barron offsite. Ground has already been prepared by pipeline companies

0920 Tammy Meeler (Dona Park resident) onsite. Shows areas of site where she believes drums were buried about 25 years ago.

1008 Omar Valdez offsite. Tammy Meeler offsite. Phil Bredfeldt continues walking

Location Dona Park, Corpus Christi Date 10/14/10

Project / Client TCEQ Dona Park Investigation

02444.019.005

Survey. PB

1017 Surface of subject property appears to be somewhat irregular and elevated relative to surrounding area. Concrete and asphalt debris visible in several areas.

1030 Joe Austin (EMC) calls. They will arrive to perform GPR survey shortly.

1055 EMC onsite. PB discusses HASP; route to hospital, slips/trips/falls, heat stress. EMC crew includes Joe Austin, John Steele, and Scott Kotara. HASP signed ~~by~~ PB by all workers.

1113 EMC begins setup of equipment.

1115 Tammy Meaker onsite

1125 Omar Valdez (TCEQ) onsite

1134 EMC begins establishing 5x10' grid in preparation for the survey

1142 Omar Valdez and Tammy Meaker offsite to attempt to gain needed access agreements for Phase I soil sampling event.

1225 Omar Valdez and Tammy Meaker onsite

1234 Begin GPR & EM survey. Crew is doing 2.5 ft transects, north and south directions

1235 Omar Valdez & Tammy Meaker offsite

Location Dona Park, Corpus Christi Date 10/14/10

Project / Client TCEQ Dona Park Investigation

02444.019.005

1251 Total survey area is 110 x 150 ft. City of Corpus Christi gas line running N/S near east end of subject property. PB

1252 Omar Valdez onsite PB

1344 Omar Valdez offsite

1349 GPR and EM survey completed. EMC is breaking down equipment. Joe Austin says that report can be expected in about two weeks.

1400 EMC crew offsite / Phil Bredfeldt offsite. End GPR/EM survey work.

PB 10/14/10

ATTACHMENT B
PHOTOGRAPHIC LOG

PHOTOGRAPH NO. 1

Date: 10/14/2010

Direction: East

Description:

Performing initial walking survey of property. Asphalt debris shown in foreground.

PHOTOGRAPH NO. 2

Date: 10/14/2010

Direction: South

Description:

View of eastern edge of property looking south. Area in the right of photograph is several feet higher than surrounding land surface.

PHOTOGRAPH NO. 3

Date: 10/14/2010

Direction: Northwest

Description:

Concrete debris near southeast extent of elevated and disturbed area. ASARCO stack shown in background.

PHOTOGRAPH NO. 4

Date: 10/14/2010

Direction: East

Description:

Signage for five buried pipelines that cross the property in an east-west orientation. Pipelines were too deep to be visible in the GPR/EM survey.

PHOTOGRAPH NO. 5

Date: 10/14/2010

Direction: Southwest

Description:

Earth Measurement Corporation personnel investigating a surface depression prior to performing GPR/EM survey.

PHOTOGRAPH NO. 6

Date: 10/14/2010

Direction: NA

Description:

GPR equipment used to perform survey. Unit is a Geophysical Survey Systems, Inc. SIR 3000 using a 400 MHz antenna.

PHOTOGRAPH NO. 7

Date: 10/14/2010

Direction: NA

Description:

EM equipment used to perform survey. Unit is a Geonics Electromagnetic meter, model EM-61.

PHOTOGRAPH NO. 8

Date: 10/14/2010

Direction: South

Description:

Earth Measurement Corporation personnel establishing grid system to be used to make transects during the GPR/EM survey.

PHOTOGRAPH NO. 9

Date: 10/14/2010

Direction: North

Description:

Earth Measurement Corporation personnel performing the GPR/EM survey. GPR unit shown.

PHOTOGRAPH NO. 10

Date: 10/14/2010

Direction: North

Description:

Earth Measurement Corporation personnel performing the GPR/EM survey. EM unit shown.

PHOTOGRAPH NO. 11

Date: 10/14/2010

Direction: Northwest

Description:

Earth Measurement Corporation personnel performing the GPR/EM survey. GPR unit shown. Manchester Avenue in background.

PHOTOGRAPH NO. 12

Date: 10/14/2010

Direction: NA

Description:

Example of surface void/depression found during walking survey of Subject Property.

ATTACHMENT C
EMC SUMMARY REPORT

EARTH MEASUREMENT CORP.

Environmental & Engineering Geophysics

GEOPHYSICAL INVESTIGATION SURVEY

ALLEGED DRUM BURIAL SITE
NORTH EAST CORNER OF
UP RIVER ROAD AND MANCHESTER AVE.
CORPUS CHRISTI, TEXAS

PERFORMED BY:
THE EARTH MEASUREMENT CORP.
ON THE DAY OF OCTOBER 14, 2010

Professionally solving subsurface questions

EARTH MEASUREMENT CORP.
Environmental & Engineering Geophysics

21 October 2010

Mr. Sam Enis
Weston Solutions, Inc.
2705 Bee Cave Road, Suite 100
Austin, TX 78746

Telephone: 512.651.7159 Fax: 512.651.7101

RE: Geophysical Subsurface Investigation Survey
Corpus Christi, Texas

EMC Project # WS091003

Dear Mr. Enis,

This report describes the results of a geophysical survey performed by the Earth Measurement Corp. (**EMC**) on October 14th, 2010 at your site in Corpus Christi, Texas.

SCOPE

The scope of this project is to locate any Underground Storage Tanks (USTs), buried drums, pipelines, or other anomalous areas within the geophysical survey boundaries defined for this site. The area investigated was approximately 150' feet by 110'.

ACQUISITION

EMC fielded a three person crew for the acquisition phase of this project: Operations Foreman- Joe Austin, Cartographer- John Steele, and equipment operator- Scott Kotara. Before surveying operations began, a five-foot by ten-foot (5' x 10') grid system was laid out over the survey site. The purpose of the grid system is to ensure uniform data acquisition and accurate correlation between surface features and any subsurface findings.

EQUIPMENT

Two different instruments and technologies were used on this site. The GPR instrument used at this site was a GEOPHYSICAL SURVEY SYSTEMS INC. (GSSI), Subsurface Interface Radar System 3000 (SIR-3000). A 400 MHz antenna was deemed the best choice for this site based on desired investigation depth and general site conditions. The SIR-3000 utilizes impulse radar technology to obtain a continuous, high-resolution

profile of the subsurface. The radar signal transmitted into the subsurface is produced by electrically discharging a pulse of electromagnetic energy from a special antenna. The transmitted pulse travels through the subsurface until it reaches a soil interface or an embedded object. Then, depending on the electrical characteristics of the interface or object, a portion of the transmitted pulse is reflected back to the surface, where it is picked up by the receiver section of the antenna. The received signal is processed and a real-time replica of the information is displayed. Depth of subsurface penetration is directly dependent upon the conductivity of the soil.
There are limitations to a GPR survey in this type of environment that need to be presented:

- Non-uniform fill material;
- Abundance of haphazard ferrous metal in fill material
- Tight clays

The electromagnetic instrument used for this project was the GEONICS ELECTROMAGNETIC METER, MODEL EM-61. The EM-61 uses induced-pulse electric fields to find buried ferrous objects while minimizing the response of host material. Stated another way, the EM-61 is a metal detector capable of measuring the amplitude response of buried metals as well as the lack of amplitude associated with non-metallic objects. The depth of penetration for this instrument is approximately ten feet (10').

PROCESSING

After the data were acquired, geotechnical software was utilized to process the EM information for the Earth's normal field of adjustments, terrain corrections and filtering to discriminate against extraneous interference. The EM data were contoured using Golden Software's Surfer9 contouring and mapping program. The GPR information was post processed using the Geophysical Archaeometry Laboratory's GPR- Slice proprietary processing package.

The maps developed for the survey were a Site Map, EM-61 Differential Map, Ground Penetrating Radar Map and an Interpretive Map. The Interpretive Map is a composite of the GPR and EM information. They show the relative locations of all subsurface findings. All maps are accurate as to scale.

INTERPRETATION

A thorough review of all the geophysical data has revealed several anomalous areas within the survey boundaries. One of these has characteristics that indicate the presence of buried drums. This area is depicted in a red cross-hatched pattern on the Interpretive Map and is centered at the point 1040N/200E. Coinciding with this anomaly are three surface holes which may be related to a drum burial location. There are also two ferrous anomalies on the site shown in a blue hatched pattern on the Interpretive Map. The first, located at the grid coordinates 1012N/195E, may be associated with the possible burial location. The second, located at grid coordinates 1102N/108E, is probably construction debris. The pipelines crossing the site in the east to west direction are

deeper than the range of the geophysical instrumentation, but two possible lines were found in the north to south direction. Both lines are shown on the interpretive map as red dashed lines.

DELIVERABLES

Included with this report are the following items:

- Equipment Descriptions
- Site Map
- Ground Penetrating Radar Map
- EM-61 Differential Map
- Interpretive Map

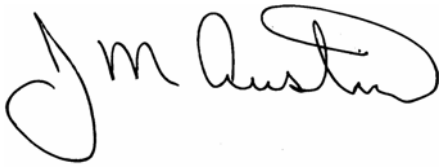
STATEMENT

Ground Penetrating Radar and Electromagnetics are not definitive measures in obstructed environments and should not be the only methods used to define the boundaries of subsurface anomalies. The interpretation of the processed data describes the anomalies as closely as possible. The survey results described in this report and illustrated on the maps represent theories supported by the evidence of the data collected. Based on experience and expertise in the field, **EMC** has every confidence in the results.

Please be advised that original project data will be held in **EMC**'s offices for a period of six months. After that time, the data will be destroyed. **EMC** personnel are always ready to answer any questions about this project. Please do not hesitate to call.

Thank you for this opportunity.

Sincerely,



Joe Austin
The Earth Measurement Corp.
Texas Professional Geoscientist
Geophysics License # 5336

EARTH MEASUREMENT CORP.
Environmental & Engineering Geophysics

GEOPHYSICAL SURVEY SYSTEMS INC. — SIR SYSTEM 3000

Ground Penetrating Radar

The Geophysical Survey Systems Inc., Subsurface Interface Radar System SIR-3000 (SIR-3000) instrument utilizes impulse radar technology to obtain a continuous, high-resolution profile of the subsurface. The radar signal transmitted into the subsurface is produced by electrically discharging a pulse of electromagnetic energy from a special antenna. The transmitted pulse travels through the subsurface until it reaches a soil interface or an embedded object. Then, depending on the electrical characteristics of the interface or object, a portion of the transmitted pulse is reflected back to the surface where it is picked up by the receiver section of the antenna. The received signal is processed and a real-time replica of the information is displayed. Depth of subsurface penetration is directly dependent upon the conductivity of the soil.

Several types of antennas are available for use with the SIR Ground Penetrating Radar (GPR) system. The defining characteristic of these antennas is their operating frequency. The higher the antenna's operating frequency, the smaller the antenna's size and pulse loop, the greater the data resolution, and the shallower the depth-of-penetration. An 80 MHz antenna is the practical minimum frequency while 2500 MHz is the practical maximum.

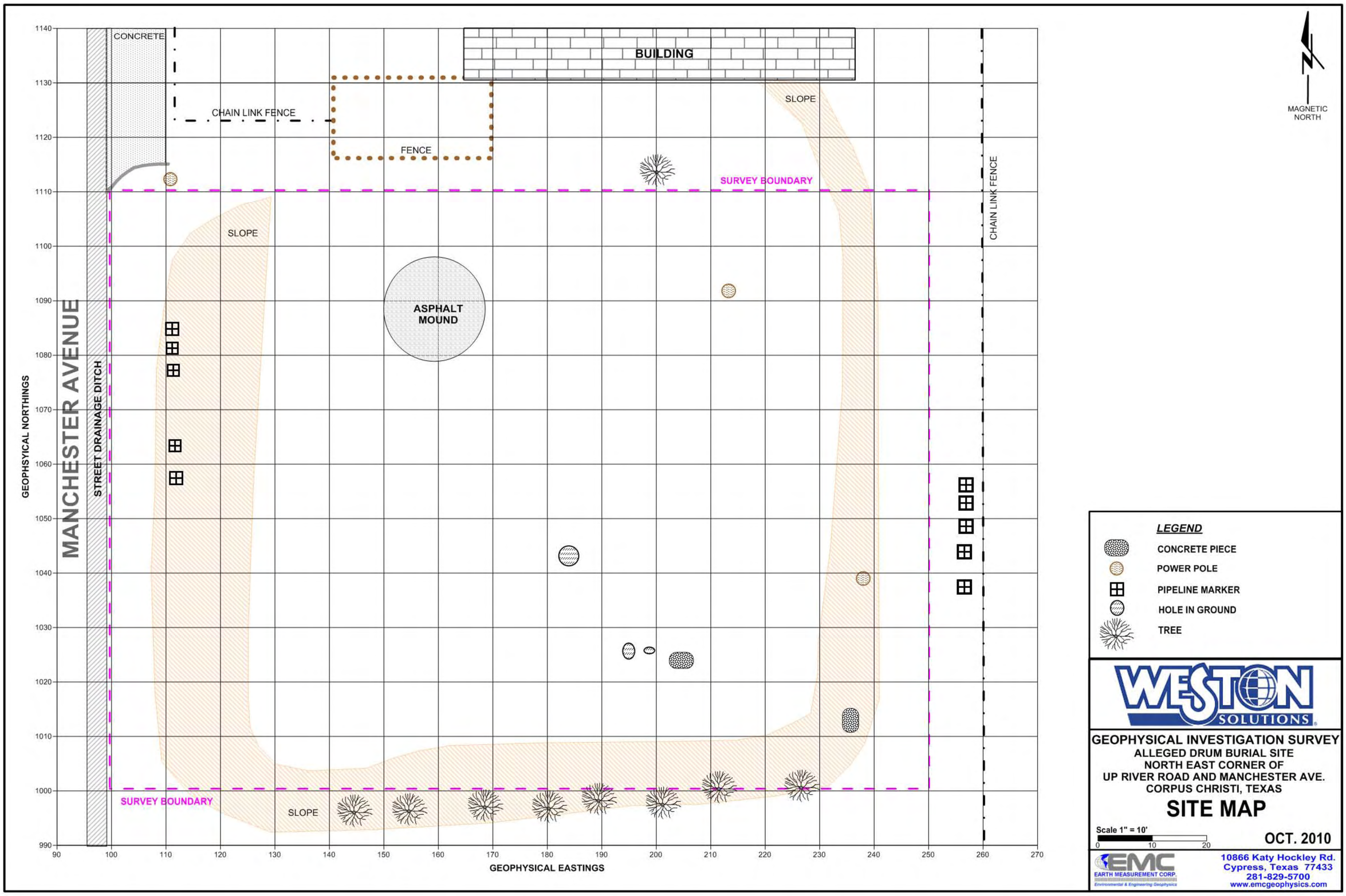
For more detailed information on all of our services, please visit our website at:
www.emcgeophysics.com

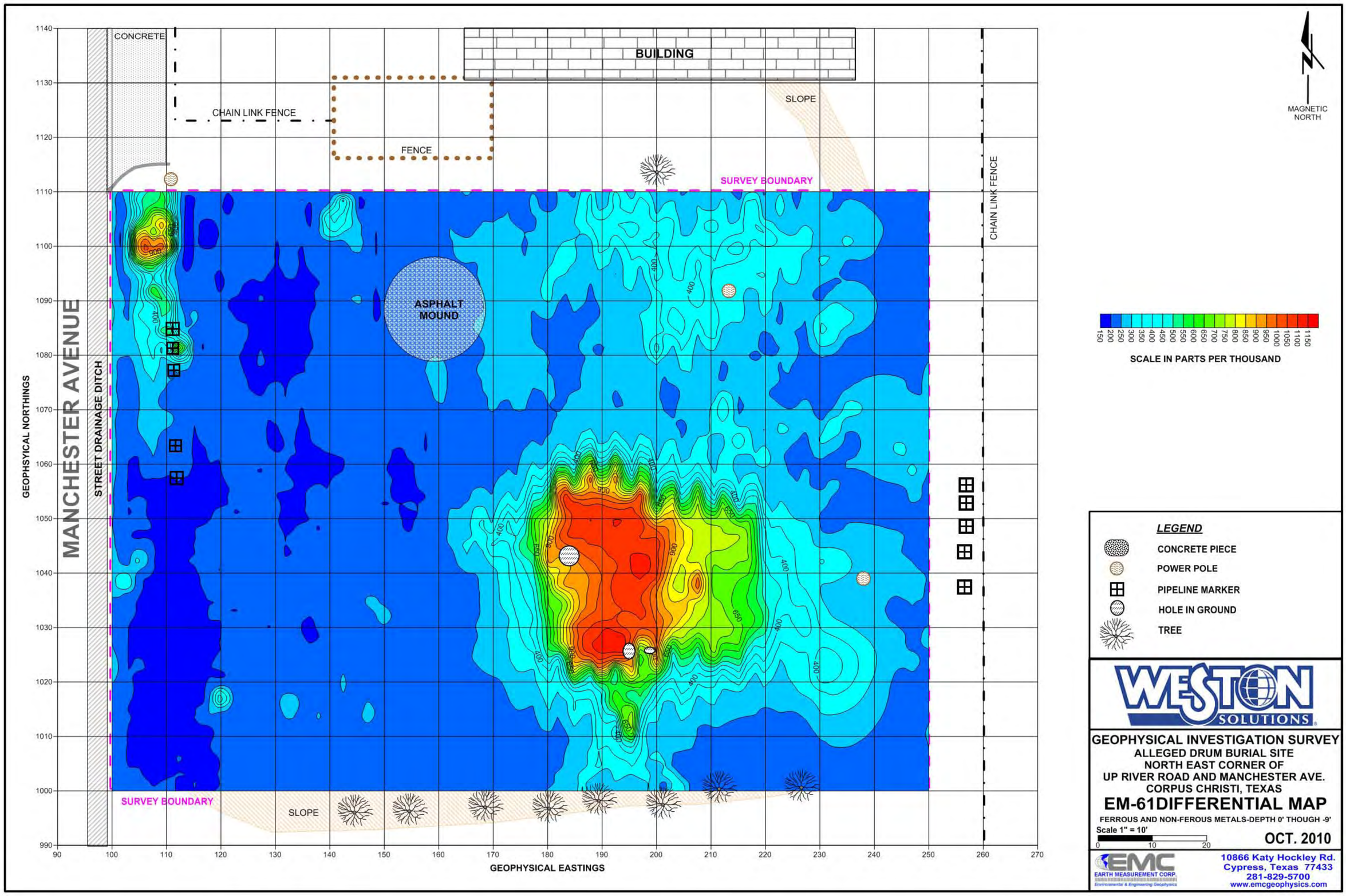
EARTH MEASUREMENT CORP.
Environmental & Engineering Geophysics

GEONICS EM-61
Electromagnetic Meter

The EM-61 is a time domain electromagnetic device that is used to find buried ferrous objects by inducing electric current beneath the surface and measuring the voltage response. The EM-61 can be used in a variety of soils and surfaces because it transmits 150 EM pulses per second, and measures target response during the off-time to minimize the response of the surrounding medium. A dual transmitter system allows for target depth estimation, while eliminating undesirable responses due to surface clutter.

Its higher power and larger coils allow for larger and deeper targets than other electromagnetic systems. The EM-61 can be applied successfully to find underground storage tanks, buried drums, pipelines, hazardous metal waste, and unexploded ordnance. The high resolution of this instrument combined with its ability to eliminate noise make the EM-61 an ideal tool for locating ferrous objects.


CONCRETE
BUILDING
CHAIN LINK FENCE
FENCE
SLOPE
SURVEY BOUNDARY
CHAIN LINK FENCE
SLOPE
ASPHALT MOUND
MANCHESTER AVENUE
STREET DRAINAGE DITCH
SURVEY BOUNDARY
SLOPE
GEOPHSYICAL NORTHINGS
GEOPHYSICAL EASTINGS
MAGNETIC NORTH
LEGEND
CONCRETE PIECE
POWER POLE
PIPELINE MARKER
HOLE IN GROUND
TREE
WESTON SOLUTIONS
GEOPHYSICAL INVESTIGATION SURVEY
ALLEGED DRUM BURIAL SITE
NORTH EAST CORNER OF
UP RIVER ROAD AND MANCHESTER AVE.
CORPUS CHRISTI, TEXAS
SITE MAP
Scale 1" = 10'
OCT. 2010
EMC EARTH MEASUREMENT CORP.
10866 Katy Hockley Rd.
Cypress, Texas 77433
281-829-5700
www.emcgeophysics.com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ALLEGED DRUM BURIAL SITE
NORTH EAST CORNER OF
UP RIVER ROAD AND MANCHESTER AVE.
CORPUS CHRISTI, TEXAS
EM-61DIFFERENTIAL MAP
FERROUS AND NON-FEROUS METALS-DEPTH 0' THOUGH -9'
Scale 1" = 10'
OCT. 2010
EMC EARTH MEASUREMENT CORP.
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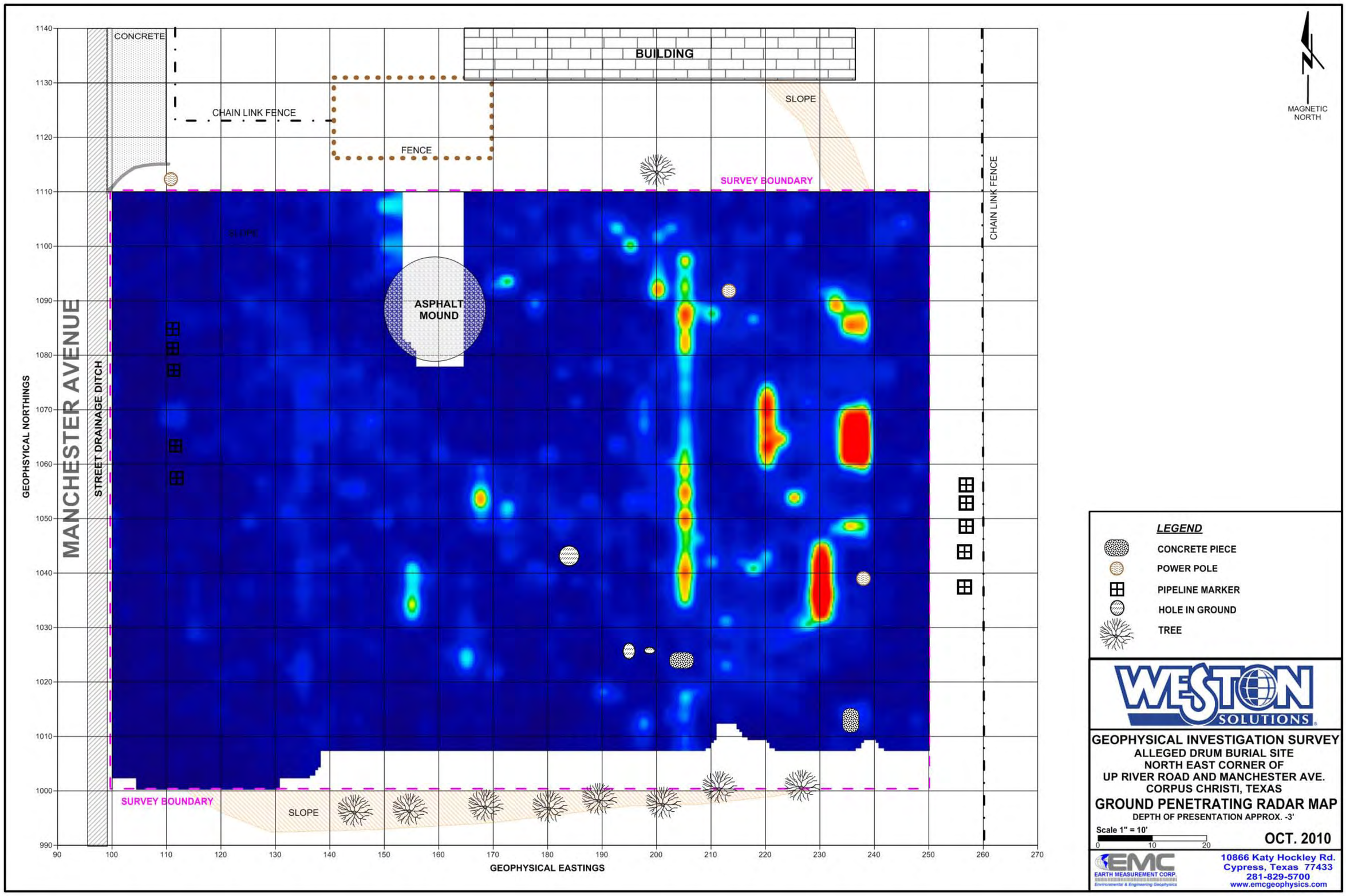
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POWER POLE
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HOLE IN GROUND
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WESTON SOLUTIONS
GEOPHYSICAL INVESTIGATION SURVEY
ALLEGED DRUM BURIAL SITE
NORTH EAST CORNER OF
UP RIVER ROAD AND MANCHESTER AVE.
CORPUS CHRISTI, TEXAS
GROUND PENETRATING RADAR MAP
DEPTH OF PRESENTATION APPROX. -3'
Scale 1" = 10'
0
10
20
OCT. 2010
EMC
EARTH MEASUREMENT CORP.
Environmental & Engineering Geophysics
10866 Katy Hockley Rd.
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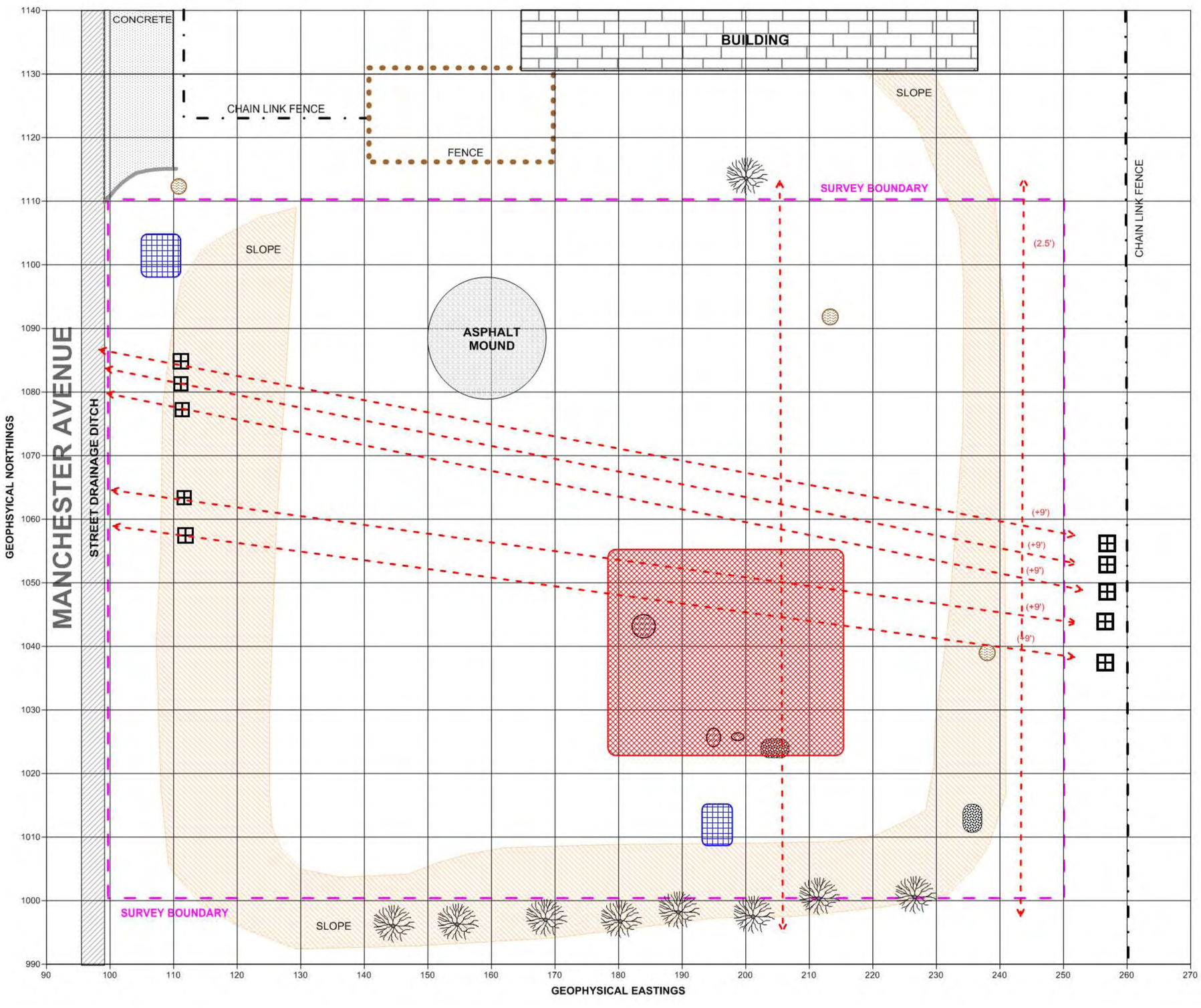

MAGNETIC NORTH

STATE OF TEXAS PROFESSIONAL GEOSCIENTIST
GEOPHYSICS - LICENSE # 5336

LEGEND

- PIPELINE
- ANOMALY - POSSIBLE AREA OF BURIAL
- ANOMALY - FERROUS DEBRIS
- CONCRETE PIECE
- POWER POLE
- PIPELINE MARKER
- HOLE IN GROUND
- TREE

WESTON SOLUTIONS

GEOPHYSICAL INVESTIGATION SURVEY
ALLEGED DRUM BURIAL SITE
NORTH EAST CORNER OF
UP RIVER ROAD AND MANCHESTER AVE.
CORPUS CHRISTI, TEXAS

INTERPRETIVE MAP

Scale 1" = 10'
0 10 20

OCT. 2010

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