



APPENDIX B
Quality Control, Safety and Other Plans

Quality Control Plan

Mid Barataria Diversion (BA-153)
Myrtle Grove, Louisiana

for
HDR Engineering, Inc.

October 23, 2013



11955 Lakeland Park Boulevard, Suite 100
Baton Rouge, Louisiana 70809
225.293.2460

Quality Control Plan
Mid Barataria Diversion Project (BA-153)
Myrtle Grove, Louisiana
LDNR Contract No. 2503-13-59, Task No. 3
File No. 18274-001-00
October 23, 2013

Prepared for:

HDR Engineering, Inc.
201 Rue Iberville, Suite 115
Lafayette, Louisiana

Attention: Mr. Mark Stanley, PE, GE
Senior Technical Advisor - Geotechnical

Prepared by:
GeoEngineers, Inc.
11955 Lakeland Park Boulevard, Suite 100
Baton Rouge, Louisiana 70809
225.293.2460

Michelle L. Ramos, PE, LEG (WA)
Geotechnical Engineer

Venu Tammineni, PE, LEED AP
Geotechnical Engineer

David S. Eley, PE
Principal

Charles L. Eustis, PE
Principal

MLR:VT:CLE:lb

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QC Log
Example Calculation Check Sheet

DRAFT

INTRODUCTION

This plan describes the process, actions and quality control (QC) documentation for the Mid Barataria Diversion (MBD) Project (BA-153). GeoEngineers, Inc. (GeoEngineers) is working with HDR Engineering, Inc. (HDR) on the MBD project. The MBD project is large-scale, long-term restoration feature recommended for implementation in Louisiana's Comprehensive Master Plan for a Sustainable Coast prepared by Louisiana Coastal Protection and Restoration Authority (CPRA). The project is located in Myrtle Grove, Louisiana.

As part of our scope, GeoEngineers is providing geotechnical borings, field and laboratory data, geologic and geotechnical interpretations, corrected field vane shear test results, soil strengths profiles, and settlement potential for soils. Each of these items and recommendations undergo a series of reviews, corrections, and further review before being considered a final product. Also as part of our scope, GeoEngineers is responsible for developing, implementing and maintaining a Quality Control Plan. This report describes this Plan.

FIELD EXPLORATION

An extensive QC program was followed for the field exploration phase that follows the general guidelines of US Army Corps of Engineers (USACE). The undisturbed samples were transported to our Baton Rouge laboratory where they were extruded and logged. Laboratory testing assignments were prepared by GeoEngineers and approved by HDR/CPRA. The laboratory testing for mini-vane tests, dry unit weight, unconfined compression, unconsolidated undrained compression, consolidated undrained compression, sieve and hydrometer analysis, consolidation tests, permeability tests and Atterberg limits followed the appropriate ASTM standards. Chain of Custody (COC) forms were created and followed the soil samples throughout the field and laboratory testing program.

The QC program for the field and laboratory testing is further discussed within the Geotechnical Data Report.

BORING LOG QUALITY CONTROL

Following the extrusion and laboratory visual logging of the undisturbed samples, the laboratory logs are reviewed by an engineer and compared to the field logs to provide initial delineation of geologic contacts, soil units and make initial lab assignment recommendations. During extrusion, small samples are taken and moisture content testing is performed. This handwritten log with the initial moisture contents becomes the "Engineers' log".

The Engineers' log is used to enter initial information into the gINT program. Once completed laboratory test results are received, the Engineers' log is compared to the laboratory data by another engineer and corrections are made within the gINT program database. Laboratory information is also entered and imported into gINT at this time. The draft logs are printed and reviewed again by an engineer or engineer assistant. At this time, the laboratory log, the Engineers log, the laboratory data sheets and the draft log are all reviewed before the final boring logs are

prepared in gINT. It is also at this time that soil contacts, units, and descriptions may be modified to reflect the most current understanding of the boring.

This process is iterative and requires close coordination between the reviewing engineer, the data entry personnel, the draft log reviewer and the senior reviewing engineer. Once these reviews have been completed, the boring information can be printed and reviewed for consistency and accuracy. The multiple iterations and steps for each boring are tracked in the QC Log (attachment).

While the final review is always performed by a senior level engineer, we use a combination of junior and senior-level engineers for the initial and intermediate reviews. We have found tremendous synergy, discussion and learning in both directions develops when junior staff has the opportunity to review senior engineer's analysis and logging.

QUALITY CONTROL OF CALCULATIONS AND ANALYSIS

For the deliverables that require calculations, assumption of soil parameters and analysis, GeoEngineers employs one of two different review processes.

For the dewatering analysis, the piezometer logs, pump test data and draw-down calculations were reviewed by a hydrogeologist and the results were summarized in a technical memorandum for the project. The analysis and the memorandum were then reviewed by a principal level hydrogeologist and engineer. The final dewatering results will be presented in a signed and stamped technical memorandum.

For other calculations, the preparing engineer sends the design assumptions and calculations (or other program data file) to the reviewing engineer. The reviewing engineer then checks the process, the soil assumptions and the calculations within the spreadsheet for accuracy and consistency. If there are questions or concerns the two engineers will discuss, consult other engineers as needed and come to agreement. When the review is complete, the reviewing engineer fills out and returns the Calculation Checksheet (attachment) to the original engineer with any comments.

This process is used for:

- Soil cross-sections
- Design soil parameters
- Correlation of field vane results
- Developing piezometer data
- Settlement calculations and
- Slope stability analysis

QUALITY CONTROL OF GEOTECHNICAL DATA REPORT

The geotechnical data report includes the details of the field exploration and laboratory test results. This document will be prepared by an engineer with help from the support staff and reviewed by the project engineer, and a senior engineer. The overall report with design calculations will be

reviewed by an independent technical reviewer before finalizing. Given below is list of technical personnel that are involved in preparing the report and the review process. It should be noted that defining the duties/responsibilities of a particular individual is difficult as most people have experience that are beyond what a simple job designation can define. This project is also staffed with the most appropriate person available for the job at the time of execution.

TECHNICAL PERSONNEL

For the purposes of the QC plan, the following people are identified as reviewing personnel. Depending on the level of QC required for a particular task, the appropriate personnel will be engaged.

Table 1: Technical Personnel*

Engineer/Hydrogeologist/ Engineer Assistant	Senior Reviewers	Independent Technical Reviewer
Larry D. Sant, PE	Michael A. P. Kenrick (Dewatering Analysis)	Gordon M. Denby, PE, PhD (Entire Project)
Joel W. Purdy	Charles L. Eustis, PE (Entire Project)	James M. Aronstein, PE (Bridge Design)
Michelle L. Ramos, PE, LEG	David S. Eley, PE (Entire Project)	David P. Sauls, PE (Levee Structures)
Venu Tammineni, PE, LEED AP		
Josh M. Pruett, PE		
Ivy A. Harmon		
James W. West		
Michael J. Kohn		

* Other engineers might get involved based on project requirements

Project: Mid Barataria Diversion Project (BA-153)
File Number: 18274-001-00
Explorations: 30% Design Phase

Exploration	Field Logs	QC	DFR	QC	COC	QC	Lab Visual Class.	QC	Prelim. Logs w/Moisture	Lab Assignments	Lab Results	QC	Prelim. Exploration Logs	QC	Final Exploration Logs	Overall Data QC	
NL-1	C	SES	VT	GKA	CLE/RW	-	-	-	-	-	-	-	JW	-	VT		
NL-2	C	SES	VT	GKA	CLE/RW	-	-	-	-	-	-	-	JW	-	VT		
NL-3	A	NM	CLE	NM	VT/RW	x	CP	JK	CP	CLE	VT	MJK/RW	MLR/JW	MLR/JW/CV	MLR/JW/VT	MLR/JW/CV	CLE
NL-3	C	SES	VT	GKA	CLE/RW	-	-	-	-	-	-	-	JW	-	VT		
NL-4	C	SES	VT	GKA	CLE/RW	-	-	-	-	-	-	-	JW	-	VT		
NL-5	C	SES	VT	GKA	CLE/RW	-	-	-	-	-	-	-	JW	-	VT		
NL-6	A	NM	CLE	NM	VT/RW	x	CP	JK	CP	CLE	VT	MJK/RW	MLR/JW	MLR/JW/CV	MLR/JW/VT	MLR/JW/CV	CLE
NL-7	C	SES	VT	GKA	CLE/RW	-	-	-	-	-	-	-	JW	-	VT		
NL-8	A	TC	VT	TC	CLE/RW	x	CP	JK	CP	CLE	VT	MJK/RW	MLR/JW	MLR/JW/CV	MLR/JW	MLR/JW/CV	CLE
NL-9	A	TC	VT	TC	CLE/RW	x		JK	CP	CLE	VT	MJK/RW	MLR/JW	MLR/JW/CV	MLR/JW	MLR/JW/CV	CLE
SL-1	C	SES	VT	CLE	CLE/RW	-	-	-	-	-	-	-	JW	-	VT		
SL-2	C	Deleted		Deleted	CLE/RW	-	-	-	-	-	-	-	-	-	-	-	
NL-10	C	SES	VT	GKA	CLE/RW	-	-	-	-	-	-	-	JW		VT		
NL-11	C	SES	VT	GKA	CLE/RW	-	-	-	-	-	-	-	JW		VT		
FV-1		IAH	VT	IAH	VT/RW	x	CP	JK	CP	-	VT	MJK/RW	VT	-	-	JW/MLR/VT	VT
FV-2		IAH	VT	IAH	VT/RW	x	CP	JK	CP		VT	MJK/RW	VT	-	-	JW/MLR/VT	VT
FV-3		IAH	VT	IAH	VT/RW	x	CP	JK	CP		VT	MJK/RW	VT	-	-	JW/MLR/VT	VT
FV-4		TP/GKA	VT	TP/GKA	CLE/RW			JK	CP			-	-	-	-	JW/MLR/VT	VT
PT-1		IAH	VT	IAH	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PT-2		TP	VT	TP	CLE/RW		CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-1		IAH	VT	IAH	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-2		IAH	VT	IAH	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-3		IAH	VT	IAH	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-4		IAH	VT	IAH	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-5		IAH	VT	IAH	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-6		IAH	VT	IAH	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-7		TP	VT	TP	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-8		TP	VT	TP	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-9		TP	VT	TP	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-10		TP	VT	TP	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-11		TP	VT	TP	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-12		TP	VT	TP	CLE/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-13		IAH	VT	IAH	VT/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	JW	MLR/JW/CV	JW	VT	MLR
PZ-14		IAH	VT	IAH	VT/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
PZ-15		IAH	VT	IAH	VT/RW	x	CP/SC	JK	CP	MJK	VT	MJK/RW	MJK	MLR/JW/CV	JW	VT	MLR
IS-1	A	NM	CLE	NM	CLE	x	CP	JK	CP	CLE	VT	MJK/RW	JW	MJK/CV	MLR/JW/CV	JW	MLR
IS-2	A	NM/TC	CLE	NM/TC	RW/CLE	x	CP	JK	CP	CLE	VT	MJK/RW	JW	JW/CV	MLR/JW/CV	JW	MLR
IS-3	A	TC	VT	TC	RW/CLE	x	CP	JK	CP	CLE	VT	MJK/RW	JW	JW/CV	MLR/JW/CV	JW	MLR

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IS-4	C	SES	VT	GKA	RW/CLE	-	-	-	-	-	-	-	JW	-	VT	MLR	
IS-5	C	SES	VT	GKA	RW/CLE	-	-	-	-	-	-	-	JW	-	VT	MLR	
IS-6	C	SES	VT	GKA	RW/CLE	-	-	-	-	-	-	-	JW	-	VT	MLR	
IS-7	A	TC/NM	VT	TC/NM	RW/CLE	x		JK	CP	CLE	VT	MJK/RW	JW	MJK/CV	MLR/JW/CV	JW	MLR
IS-8	A	TC/NM	VT	TC/NM	RW/CLE	x		JK	CP	CLE	VT	MJK/RW	JW	MJK/CV	MLR/JW/CV	JW	MLR
IS-9	A	TP	VT	TP	RW/CLE	x	CP	JK	CP	CLE	VT	MJK/RW	JW	MJK/CV	MLR/JW/CV	JW	MLR
IS-10	A	NM	VT	NM	RW/CLE			JK	CP	CLE	VT	MJK/RW	JW	MJK/CV	MLR/JW/CV	JW	MLR
IS-11	C	SES	VT	GKA	RW/CLE	-	-	-	-	-	-	-	JW	-	VT	MLR	
IS-12	C	SES	VT	GKA	RW/CLE	-	-	-	-	-	-	-	JW	-	VT	MLR	
IS-13	A	TC	VT	TC	RW/CLE	x		JK	CP	CLE/VT	VT	MJK/RW	JW	MJK/CV	MLR/JW/CV	JW	MLR
IS-14	C	SES	VT	GKA	RW/CLE	-	-	-	-	-	-	-	JW	-	VT	MLR	
IS-15	C	SES	VT	GKA	RW/CLE	-	-	-	-	-	-	-	JW	-	VT	MLR	
IS-16	A	TC	VT	TC	RW/CLE	x		JK	CP	CLE	VT	MJK/RW	JW	MJK/CV	MLR/JW/CV	JW	MLR
IS-17	A	TC	VT	TC	RW/CLE	x		JK	CP	VT	VT		JW	MJK/CV	MLR/JW/CV	JW	MLR
M-1		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-2		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-3		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-4		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-5		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-6		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-7		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	CLE	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-8		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	CLE	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-9		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	CLE	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-10		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	CLE	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-11		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	CLE	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-12		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	CLE	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-13		DAS	VT	CLE	CLE/RW	x	CP	SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-14		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-15		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
M-16		DAS	VT	CLE	CLE/RW	x	CP	OS/SEF	CP	VT	VT	MJK/RW	VT	MJK/CV	VT	VT	DSE
R-1	A	DAS	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	CLE/VT	MJK/RW	VT	MLR/CV	VT	VT	MLR
R-2	A	DAS	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	CLE/VT	MJK/RW	VT	MLR/CV	VT	VT	MLR
R-3	A	DAS	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	CLE/VT	MJK/RW	VT	MLR/CV	VT	VT	MLR
R-4	A	DAS	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	CLE/VT	MJK/RW	VT	MLR/CV	VT	VT	MLR
R-5	A	DAS	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	CLE/VT	MJK/RW	VT	MLR/CV	VT	VT	MLR
R-6	A	DAS	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	CLE/VT	MJK/RW	VT	MLR/CV	VT	VT	MLR
B-1	A	NM	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	VT	VT	MJK	MJK/CV	MLR/JW/CV	VT	MLR
B-1	Aa	NM	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	VT	VT	MJK	MJK/CV	MLR/JW/CV	VT	MLR

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B-2	A	NM	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	VT	VT	MJK	MJK/CV	MLR/JW/CV	VT	MLR
B-3	C	NM	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	-		MJK	MJK/CV	MLR/JW/CV	VT	MLR
B-4	A	NM	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	VT	VT	MJK	MJK/CV	MLR/JW/CV	VT	MLR
B-5	C	NM	VT	CLE	CLE/RW	x	CP	JK	CP	CLE	-		MJK	MJK/CV	MLR/JW/CV	VT	MLR

DRAFT

Calculation Checksheet

Project No. _____ Project Title: _____

Deliverable Title: _____

Calculations Description/Location in Deliverable Text (list): _____

Originator: _____ Checked by: _____ Date: _____

Checking method (describe): _____

Comments: _____

Attach checksheets, numbered consecutively.

GEOENGINEERS, INC.
PROJECT SPECIFIC SAFE WORK PLAN

SITE

The Mississippi River and Batture at Mile Marker 60.4, the area between the Mississippi River & Tributaries (MR&T) levee and the Mid-Barataria marsh levee (West levee) in Myrtle Grove, LA and the Mid Barataria marsh.

DATE

February 18, 2013

PROJECT NUMBER

18274-001-00

PROJECT MANAGER

Venu Tammineni
Work: 225-293-2460
Cell: 614-209-2580

David Eley
Work: 225-293-2460
Cell: 225-772-4990

CLIENT

HDR Engineering, Inc.

CLIENT CONTACT

Mark Stanley

CORPORATE HEALTH AND SAFETY OFFICER

Wayne Adams
Work: 253-722-2793
Cell: 253-350-4387

SITE SAFETY OFFICER

Gregory Adams
Cell: 225-963-2404

GEOENGINEERS PERSONNEL

Jeremiah Garms 337-501-2758
Robert Clark 225-317-3107
Jamie McLeod 504-644-2894

SUBCONTRACTORS

Fugro Consultants, Inc. 225-614-8201
Southern Earth Sciences, Inc. 225-279-0804
Specialized Environmental Resources LLC 337-886-0883
All American Services

EMERGENCY CONTACT INFORMATION

Any Emergency 911

Location of Nearest Telephone
1. Vehicle

Nearest Medical Treatment Center

Ochsner Medical Center
West Bank Campus
2500 Belle Chasse Hwy.,
Gretna, LA 70056

Purpose of Activities

Drill and sample soil boring for geotechnical design.

SITE SAFETY SIGNATURE SHEET

The following site personnel have read the Safe Work Plan attached and are familiar with its provisions:

NAME	SIGNATURE	DATE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Plan prepared by: Venu Tammineni _____ (date)

Plan reviewed by: _____ (date)

GENERAL SAFETY MEASURES

When working in the area of heavy equipment activity, access shall be limited to authorized personnel wearing appropriate personal protective equipment. All personnel, subcontractors, and consultants shall adhere to the provisions of the GeoEngineers, Inc. (GeoEngineers) Project Specific Safe Work Plan (SWP). Copies of the SWP shall be available to all personnel on-site.

SITE SAFETY OFFICER RESPONSIBILITIES

The Site Safety Officer shall monitor all activities of equipment and personnel at the project site. Responsibilities will include the following:

1. Limiting access to authorized personnel.
2. Notification during emergency procedures.
3. Documenting all injuries and safety incidents.
4. Organize tailgate safety meetings on-site.
5. Collect daily Job Hazard Analysis forms from field loggers.

PPE

- Steel-toed Boots
- Hard Hat
- Safety Glasses
- Hearing Protection
- Personal flotation devices (PFD)- when working over water
- Safety vest-when working near traffic hazards

VEHICLE SAFETY

All drill rigs must have a first aid kit and fire extinguisher.

Drill rig cables, hoses, and ropes are to be safely secured and periodically checked for abrasion or defect. Unsafe equipment shall be replaced immediately.

The drill rig operator shall perform a pre-startup safety inspection/observation prior to start of work.

Field vehicles shall park in an area a safe distance from operating equipment and vehicle traffic. Care must be given when approaching heavy equipment. Personnel on foot should approach from a direction facing the operator and not a blind side. Eye-to-eye contact should be made before proceeding within the working limits of the operator and their equipment.

SITE CLEARING

GeoEngineers plans to use a forestry mulcher for most heavy clearing. This machine may generate flying debris within a 100 foot radius and any people in the area should stay a minimum of this distance away. Cleared vegetation is shredded by the machine and will be spread on the ground. Care should be taken when walking or driving over this mulch in case there are sharp wood splinters that could puncture a boot or tire, or cause a person to trip.

Limited hand clearing may be necessary in some areas. This may require the use of a chain saw or machete. This clearing equipment should only be used when no other options exist, and additional PPE such as leg guards and face shields will be used where practical. Any time there is hand clearing, there must be at least two people present.

OVERHEAD HAZARDS

Overhead hazards include utility lines and trees. Prior to performing work, the elevation of overhead hazards shall be determined. Equipment shall be located to maximize the clearance from overhead hazards (minimum of 10 feet clearance).

TREES

Always maintain a high sense of awareness when working in a wooded environment. During a storm or high wind event tree limbs may fall or an entire tree may come down. Site personnel working in this type of environment should conduct a task safety assessment of the area taking into consideration weather conditions, weaker trees that show signs of rot, downed trees or areas that may have been recently thinned. If there is a concern about safety, the person should leave the area and inform the drilling coordinator immediately.

UNDERGROUND HAZARDS

Louisiana OneCall should be contacted prior to drilling activities. The property owner is responsible for marking the location of their own underground utilities. A minimum of 3 feet clearance shall be given to marked utilities. If drilling near utilities is required, hand excavation and probing shall be performed prior to drilling activities.

MOVING AND ROTATING MACHINERY

Drilling activities involve the use of large, heavy, moving, and rotating equipment. Loose fitting clothing that can be caught or snagged should be avoided. Working gloves should be worn while working with moving metal parts and equipment.

WORKING OVER WATER

Personnel working over or near water are shall be provided with personal floatation devices (PFDs), and those employees, such as line handlers, who are engaged in work which they may be pulled into the water or are within 6 feet of the edge of a vessel (without railings) shall wear the PFDs. Prior to and after each use, the PFD shall be inspected for defects which would alter their strength of buoyancy. Defective units should not be used. Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. At least one lifesaving skiff shall be immediately available at locations where personnel are working over water.

TRIP AND SLIP PROTECTION

Good housekeeping shall be maintained at the site to prevent trip and slip hazards.

BIOLOGICAL HAZARDS

Care should be exercised to avoid bees, yellow jackets, or other stinging or biting insects. High topped boots should be worn when working in tall grass to protect against snakebites.

TRAFFIC HAZARDS

Field activities taking place in public streets or on road shoulders shall use flagging and traffic control during the duration of the activities. High visibility safety vests will be worn by all personnel when working in traffic hazard areas.

MOVING SAMPLES AND OTHER MATERIALS

Care should be taken while moving samples and other field material manually or by machine to avoid injuries. Be aware of trip hazards and pinch points. Make sure that the samples are secured vertically and safe to be transported prior to moving them with a fork lift. Fork lift operators shall have formal training and documentation of such training.

MATERIAL SAFETY DATA SHEET (MSDS)

MSDS for Portland cement, bentonite, gasoline and diesel are attached to this PSSWP.

DAILY FIELD REPORTING

Job Hazard Analysis Sheets/Tailgate Safety Meetings should be reviewed daily prior to the start of work. Safety meetings should be noted in daily filed logs.

INCLEMENT WEATHER/HIGH WATER EMERGENCY ACTION PLAN

During periods of inclement weather where potential for excessive rutting or instant flooding exists, drill rigs and support vehicles will be, moved to higher ground.

The Mississippi River stage will be monitored from the Carrollton Gauge (01300) at New Orleans at river mile 102.8 will be monitored. The gauge information is available at: <http://www.mvn.usace.army.mil/cgi-bin/watercontrol.pl?01300>

Flood stage is at 17 feet NAVD88 (river gauge). However, USACE will not allow drilling in the batture and within 1500 feet of the Mississippi River and Tributaries (MR&T) levee toe on the protected side when the river level reaches El 11 feet at the Carrollton Gauge. Flood advisories and warnings will also be monitored through NOAA's NWS website (www.weather.gov)

Flood stage and predictions will be monitored; all equipment and personnel shall be removed from the batture and levee prior to the Mississippi River reaching the flood stage of 11 feet at the Carrollton gauge.

Hurricane

In the event of hurricane, the equipment will be demobilized or moved to a safe location and the on-site personnel will be evacuated.

Lightning Storm

Lightning can present a serious safety hazard! Summer is often the peak season for this weather phenomenon. Personnel working outside during this time of year should plan in advance safety measures to be taken to ensure safety. To avoid being struck by lightning you need to know:

- NO PLACE outside is safe when thunderstorms are in the area!
- If you hear thunder, lightning is close enough to strike you.
- When you hear thunder, immediately move to safe shelter.
- Safe shelter is a substantial building or inside an enclosed, metal-topped vehicle.
- Stay in safe shelter for 30 minutes after you hear the last clap of thunder.

Last Resort Outdoor Risk Reduction Tips:

- NO PLACE outside is safe when lightning is in the area, but if you are caught outside with no safe shelter anywhere nearby the following actions may reduce your risk:
 - Immediately get off elevated areas such as hills, mountain ridges or peaks
 - NEVER lie flat on the ground
 - NEVER use a tree for shelter
 - NEVER use a cliff or rocky overhang for shelter
 - Immediately get out and away from ponds, lakes and other bodies of water
 - Stay away from objects that conduct electricity (barbed wire fences, power lines, windmills, etc.)

- UNDER NO CIRCUMSTANCES should ANY of the above actions be taken if a building or an all-metal vehicle is nearby

If Someone Is Struck:

- Victims do not carry an electrical charge and may need immediate medical attention.
- Call 911 for help.
- Monitor the victim and begin CPR or AED, if necessary.

NEAREST MEDICAL TREATMENT CENTER

Ochsner Medical Center
West Bank Campus
2500 Belle Chasse Hwy.,
Gretna, LA 70056

Directions:

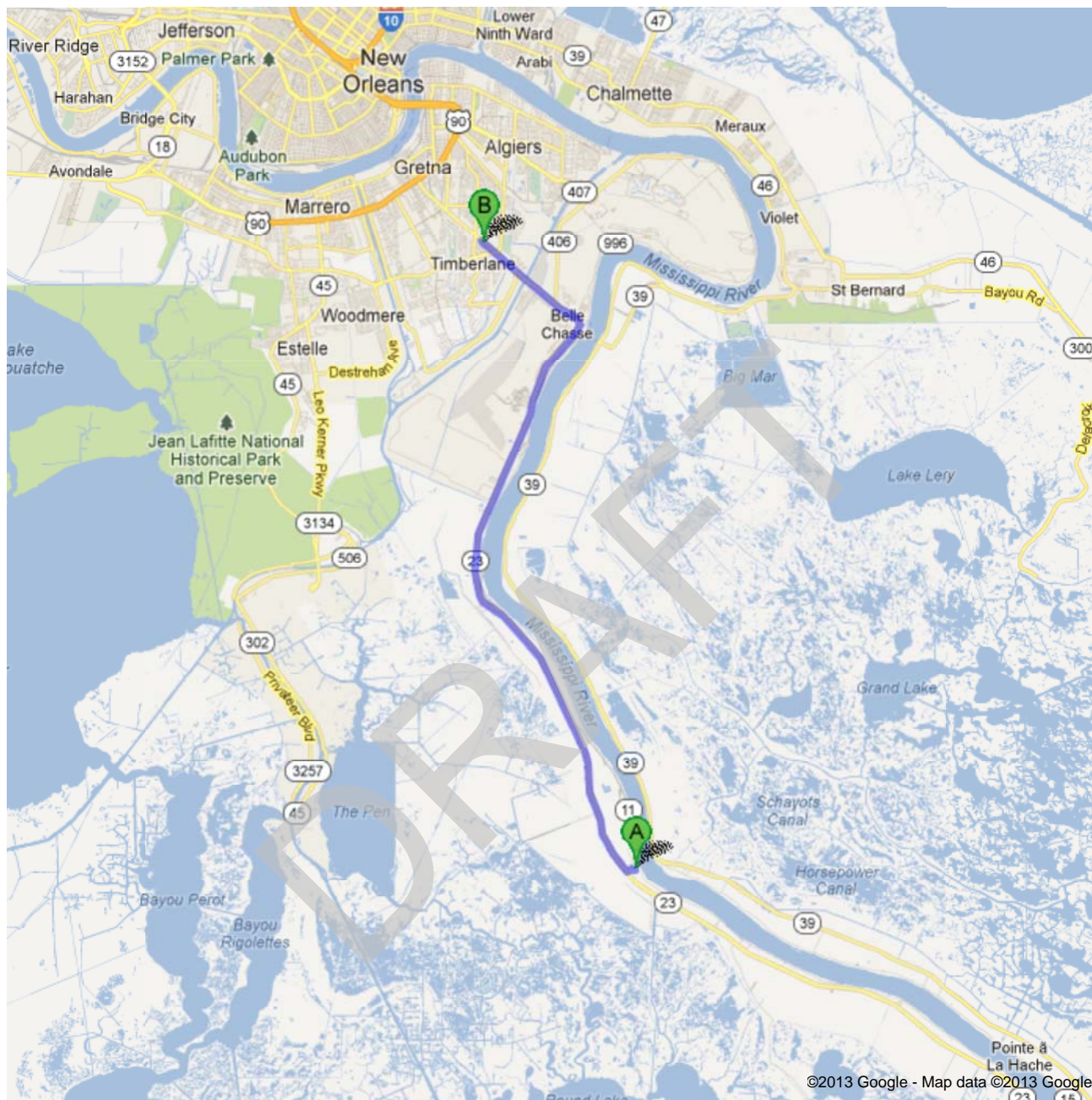
1. Head southwest on Bradish St toward Division St
2. Turn left onto Division St
3. Take the 1st right onto Ironton Rd
4. Take the 1st right onto LA-23 N
5. Make a U-turn

Destination will be on the right
2500 Belle Chasse Hwy
Gretna, LA 70056

Street map attached



Directions to 2500 Belle Chasse Hwy, Gretna, LA
20.0 mi – about 28 mins

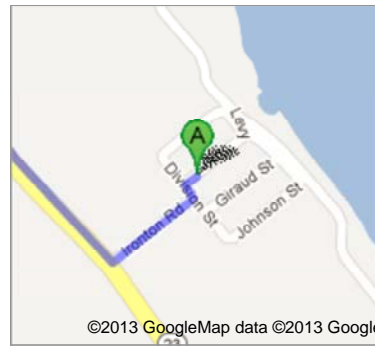


"Confidential Information; Privileged & Confidential Work Product"



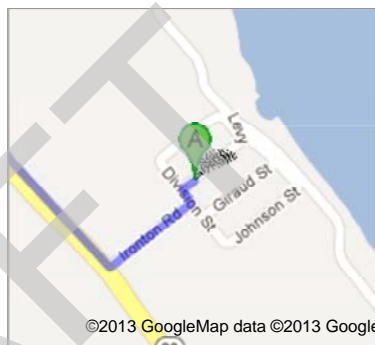
Directions to 2500 Belle Chasse Hwy, Gretna, LA 70056
20.0 mi – about 28 mins

Ironton, LA



©2013 GoogleMap data ©2013 Google

1. Head **southwest** on **Bradish St** toward **Division St**



©2013 GoogleMap data ©2013 Google

go 118 ft
total 118 ft

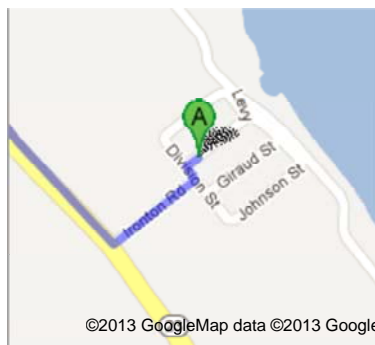
2. Turn left onto **Division St**



©2013 GoogleMap data ©2013 Google

go 131 ft
total 249 ft

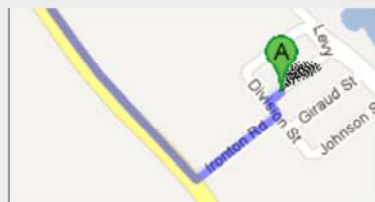
3. Take the 1st right onto **Ironton Rd**



©2013 GoogleMap data ©2013 Google

go 0.2 mi
total 0.2 mi

4. Take the 1st right onto **LA-23 N**
About 25 mins

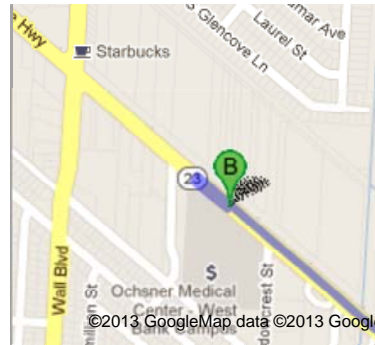


go 19.7 mi
total 19.9 mi

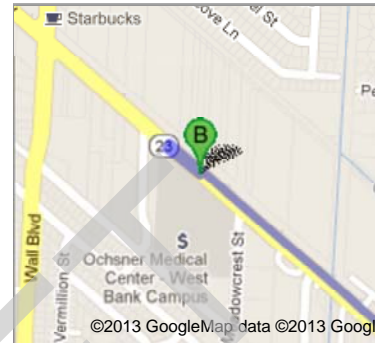
"Confidential Information; Privileged & Confidential Work Product"

- 23 5. Make a U-turn
Destination will be on the right
About 2 mins

go 390 ft
total 20.0 mi



B 2500 Belle Chasse Hwy, Gretna, LA 70056



These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2013 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

DRAFT

Best Management Practices

Geotechnical Services
Mid Barataria Sediment Diversion (BA-153)
Coastal Protection and Restoration Authority

January 17, 2013



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Figure 1: USGS Topographic Map

DRAFT

PURPOSE

The purpose of this Best Management Practices (BMP) document is to establish procedures to minimize disturbance to wetlands, control erosion and sediment transport, and maintain quality of surface water during field work performed by GeoEngineers, Inc. for the Mid Barataria Sediment Diversion (MBSD) Project (BA-153). GeoEngineers is working with HDR, Inc. (HDR) under an IDIQ contract with the State of Louisiana Coastal Protection and Restoration Authority (CPRA).

MBSD PROJECT

The MBSD project is a large scale, permanent river diversion feature that will restore the natural over-land flooding cycle of the Mississippi River and Tributaries (MR&T). The area between the MR&T levee and the Mid-Barataria marsh levee (West levee) is relatively flat as can be observed on Figure 1. Highway 23 (Hwy 23) runs approximately north-south through the project area. The batture and the area between the MR&T levee and Hwy 23 has vegetation including trees and shrubs. Vegetation clearing will be required in these areas for drill rig access. The area between Hwy 23 and the West levee is predominantly open agriculture land. Multiple drainage channels within the open fields drain excess water into perimeter drainage channels that are pumped to remove water to the marsh on a regular basis.



BEST MANAGEMENT PRACTICES

Wetlands

The area in general has a relatively flat terrain (Figure 1). After receiving the required permits, soil borings and cone penetrometer test (CPT) locations will be located in the field using survey techniques. Soil borings will be advanced using wet/mud rotary methods. CPT's will be pushed using a CPT rig. To minimize disturbance to wetland, the following BMP's will be followed:

1. Select the most appropriate drilling equipment to minimize disturbance to wetlands.
2. Ensure that access routes are determined to minimize disturbance during ingress and egress to a boring/CPT location. The number of routes to access the soil borings will be kept to a minimum. When possible existing agricultural roads will be used.
3. All equipment used in the construction will be visibly checked for hydraulic oil or other leaks daily. Such leaks will be repaired prior to further use.
4. Although the shortest route is preferred at most of the soil boring locations, a longer route will be given consideration if that keeps the drill rigs from entering designated wetlands.
5. All-Terrain Vehicle (ATV) drill rigs on tires/tracks will be preferred to truck mounted drill rigs in wetlands and other soft ground areas to minimize ground surface disturbance.



ATV Drill Rig (Ardco)



Dedrich Track Drill Rig

6. The wooded area between Hwy 23 and the MR&T levee will be cut at grade instead of uprooting the trees. This will keep the root bulbs intact. The vegetation trimmings will be spread around the area which will help in providing a cushion reducing ground disturbance induced by movement of drilling equipment.
7. The field exploration in the Mid Barataria marsh will be performed using a pontoon mounted drill rig that will minimize disturbance during soil boring access.
8. Marsh above water will not be disturbed during the field exploration. Boring locations and access routes will be through open water areas and not marsh vegetation.
9. Equipment and supplies will be delivered to the proposed staging area shown on Figure 1 to prevent unauthorized personnel and equipment from entering other areas of the site. The proposed staging area was a former lay-down yard and has a good base for vehicle traffic.

Erosion Control, Sediment Control, and Water Quality

Erosion control is any source control practice that protects the soil surface and prevents soil particles from being detached by rainfall, flowing water or wind. Sediment control is any practice that traps soil particles after they have been detached and moved by rain, flowing water, or wind. Based on the attached USGS topographic map (Figure 1), there is about 5 feet variation in grade over approximately 12,000 feet between the MR&T levee and West levee. The project area is flat and vegetated; therefore, the potential for erosion is minimal.

The following measures will be used to control erosion and sediment transport, and maintain water quality during geotechnical field work:

1. To minimize ground surface disturbance and equipment from tracking mud on to Hwy 23, a staging area is proposed adjacent to Hwy 23 (Figure 1). As stated previously, this area has a good base for vehicle traffic.
2. The drill rigs will follow designated routes preferably along established roads and through grass areas to minimize disturbance.

3. When possible access routes will be located sufficiently far from drainage canals or other water bodies to minimize the potential for sediment and debris entering the water during site activities such as drilling and clearing.
4. To prevent surface water from entering the groundwater through boreholes during drilling operations,
 - a. Drilling mud will be circulated in the borehole during drilling to prevent an open hole into which surface water could drain.
 - b. Cement-bentonite grout will be used to backfill the borehole full depth upon completion of drilling.
5. To prevent contamination during drilling operations, only bentonite and/or biodegradable polymers will be used to thicken drilling mud, if necessary. Any other materials will be prohibited unless approved by HDR.
6. To prevent hydraulic oil from entering the boreholes, the drill rigs will be checked for any leaks daily. Any such leaks will be repaired prior to further use.
7. To control sediment run-off from soil cuttings generated during drilling operations, soil cuttings will be spread on-site in vegetated areas away from the drainage canals. Care will be taken to not discard any of the soil cuttings in to the drainage canals
8. To minimize soil cuttings from soil borings, CPT explorations are planned at regular intervals. CPT explorations do not produce any soil cuttings. All CPT explorations will be backfilled full depth with cement-bentonite grout starting at the bottom of the hole to prevent surface water from contaminating groundwater.
9. To prevent disturbance of oyster beds while accessing the proposed Mid Barataria marsh borings, travel routes will be determined in a way to avoid crossing oyster bed sites.

REFERENCES





1. Louisiana Department of Environmental Quality (LDEQ) and Louisiana Department of Transportation and Development (LDOTD), Construction of Geotechnical Boreholes and Groundwater Monitoring Systems Handbook, Dated December 2000.
2. U.S. Army Corps of Engineers, Engineering and Design, EM 1110-1-1804 Geotechnical Investigations
3. Recommended Forestry Best Management Practices for Louisiana, Dated 2000
4. CPRA General Quality Assurance Project Plan, Dated October 2, 2012.
5. Louisiana Department of Natural Resources, Best Management Practices for Coastal Louisiana Nonpoint Source Pollution, Dated 2008

DPS : KMC

P:\1818274001\00CAD\USGS contour map.dwg\TAB.LAYOUT1 modified on Jan 21, 2013 - 10:38am



LEGEND

-  PROJECT AREA
-  CONTOUR (0 FT)
-  CONTOUR (5 FT)
-  CONTOUR (10 FT)



USGS TOPOGRAPHY MAP

Mid Barataria Sediment Diversion (BA-153) Project
Plaquemines Parish, Louisiana



Figure 1

Notes:
 1. The locations of all features shown are approximate.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: 1. Aerial image was taken from Google Earth Pro., Licensed to GeoEngineers Inc., Imagery dated: 10/29/2012
 2. Elevation data was taken from USGS, 1/9-Arc Second National Elevation Database, Dated 2006

List of ASTM Standards

ASTM Standard	Description
D1586	Penetration test and split-barrel sampling of soil
D1587	Thin-walled tube sampling of soil for geotechnical purposes
D2487	Classification of soil for engineering purposes (unified soil classification system)
D2488	Description and identification of soil (visual-manual procedure)
D4220	Preserving and transporting soil samples
D1140	Amount of material in soil finer than No. 200 (75 μ m) sieve
D2216	Laboratory determination of water (moisture) content of soil and rock by mass
D4648	Laboratory miniature vane shear test for saturated fine-grained clayey soil
D7263	Laboratory determination of density (unit weight) of soil specimens
D2850	Unconsolidated undrained triaxial compression test on cohesive soil
D4767	Consolidated undrained triaxial compression test for cohesive soil
D2166	Unconfined compressive strength of cohesive soil
D422	Particle size analysis of soil
D2435	One-dimensional consolidation properties of soil using incremental loading
D2974	Moisture, ash and organic matter of peat and other organic soil
D854	Specific gravity of soil solids by water Pycnometer
D5084	Measurement of hydraulic conductivity of saturated porous materials using a flexible wall permeameter
D4318	Liquid limit, plastic limit and plasticity index of soil
D7764	Pre-installation acceptance testing of vibrating wire piezometers
D4221	Standard Test Method for Dispersive Characteristics of Clay Soil by Double Hydrometer