Region 6 Compliance Assurance and Enforcement Division

# INSPECTION REPORT

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| Inspection Date(s): | 10/10/2017 |
| Media: | Water |
| Regulatory Program(s) | Clean Water Act |
| Company Name: | **City of New Iberia** |
| Facility Name: | **Sewerage District #1 of Iberia Parish & City of New Iberia -Tete Bayou WWTP** |
| Facility Physical Location: | 200 Parker Street |
| (city, state, zip code) | New Iberia, LA 70560 |
| Mailing address: | 800 Sucrose Drive |
| (city, state, zip code) | New Iberia, LA 70560 |
| County/Parish: | Iberia Parish |
| Facility Contact: | Vince Palumbo — Director |
| | 337-369-2362 |
| | Albert J. Lewis/ Dove Environmental-Operational Manager |
| | 337-369-2376 |
| FRS Number: | 110001253429 |
| Identification/Permit Number: | LA0065251 |
| Media Number: | AI#30581 |
| NAICS: | 221320 |
| SIC: | 4952 |

Personnel participating in inspection:

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|---|---|---|---|
| Michael Williams | EPA / 6EN-WMH | Inspector | 281-983-2150 |
| Shane Miller | LDEQ | Inspector | 505-366-8402 |
| Albert J. Lewis | Dove Environmental | Operation Manager | 337-369-2376 |
| Barry C. Segura | Statewide Electrical | Sewer District Rep | 337-364-9862 |
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| EPA Lead Inspector Signature/Date | MICHAEL WILLIAMS Digitally signed by MICHAEL WILLIAMS DN: c=US, o=U.S. Government, ou=USEPA, ou=Staff, cn=MICHAEL WILLIAMS, dnQualifier=0000015063 Date: 2017.12.18 08:31:45 -06'00' | |
| | Michael D. Williams | Date |
| Supervisor Signature/Date | Carol Peters (signature) | 12/18/17 |
| | Carol Peters | Date |

## Section I - Introduction

### PURPOSE OF THE INSPECTION

EPA Region 6 inspector, Michael Williams, arrived at Sewer District #1 of Iberia Parish and City of New Iberia-Tete Bayou Wastewater Treatment Plant (WWTP). at 9:25 am on October 10, 2017 for an unannounced inspection. LDEQ inspector, Shane Miller were present and assisted with the inspection. We met with Albert J. Lewis, Operations Manager. I presented my credentials to Albert and informed him that this was an EPA lead inspection to determine compliance with the Clean Water Act and the 2005 Consent Decree. The scope of the inspection was with permit LA0065251, the facility operation and maintenance under the Clean Water Act.

The information presented in this report is based on the materials and information supplied by the City of New Iberia, Iberia Parish, representatives (the permittee), observation during the inspection and records and reports maintained by the permittee.

### FACILITY DESCRIPTION

Sewer District #1 of Iberia Parish and City of New Iberia-Tete Bayou WWTP is located in New Iberia, LA. The plant is an activated sludge process. The plant consists of one grit removal chamber, bar screen, 4 aeration basins, 2 secondary clarifiers, 2 chlorine chambers, digester, dewatering facility with belt press that also receives solids from the city's other treatment plant. The plant also has an equalization lagoon for wet weather events. The design flow for the plant is 2.5 MGD. The plant is currently under a Consent Decree.

## Section II- Observations

This inspection revealed the following observations:

- As of the day of the inspection, the City of New Iberia appeared to be in compliance with their consent decree. Corrections to record keeping noted during the last inspection were completed. The city has not done any physical work to the equalization pond that has erosion. The equalization ponds were originally built between 2004 thru 2005 to comply with The City of New Iberia consent decree. The erosion has not caused a breech in the pond that would have resulted in a bypass or excursion. Without addressing the issue, it may cause a discharge or bypass during a wet weather event in the future. The City does need to be proactive in addressing the issue to ensure no breech ever occurs. The city has hired Domingue Szabo & Associates INC who evaluated the erosion problem this year. The study also provided options to repair or replace and the potential cost of each (see Appendix 1). The city is currently evaluating each option and no final decision has been concluded.
- On the day of the inspection one clarifier was out of service. The bearing and center shaft was broken. The unit has been out of service since September 1, 2017. The facility estimated to have the unit back in service towards the end of November 2017.
- The chlorine chamber was full of solids on the day of the inspection and the same issue was observed during the last inspection.

## Section III- Areas of Concerns

This inspection revealed the following areas of concerns:

- The solids in the chlorine chamber could contribute and increase the total suspended solids. No erosion has resulted, but continuation of the lack of attention and maintenance will contribute to exceedance of permit limits.
- No other major area of concerns noted during the inspection.

## Section IV – LIST OF APPENDICES

- Appendix 1 - Domingue Szabo & Associates INC , Equalization Basin Report
- Appendix 2 – Tete Bayou SSO Form

# Appendix 1 - Domingue Szabo & Associates INC , Equalization Basin Report

STUDY & REPORT

ON

# TETE BAYOU WWTP EQUALIZATION BASIN LEVEE FAILURES

Prepared For

## The City of New Iberia
## &
## Iberia Parish Sewerage District No. 1

Prepared By

DOMINGUE SZABO

& ASSOCIATES, INCORPORATED
PROFESSIONAL ENGINEERS & LAND SURVEYORS

December, 2017

STATE OF LOUISIANA
GEORGE G. GLAUBRECHT
License No. 21443
PROFESSIONAL ENGINEER IN CIVIL & ENVIRONMENTAL ENGINEERING

12-7-2017

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# I. EXECUTIVE SUMMARY

Domingue, Szabo & Associates, Inc. (DS&A hereafter) has contracted with the City of New Iberia, LA (City hereafter) to study and evaluate the failures occurring at the Tete Bayou Wastewater Treatment Plant (WWTP) Equalization Basin for the purpose of determining options for repairs or reconstruction to correct the current and ongoing problems being experienced with the levees of the Basin. A scope of the study requested is included in the Contract between DSA and City. Note that ownership of the Equalization Basin is a joint ownership arrangement between two government entities – the City of New Iberia and the Iberia Parish Sewerage District No. 1 (IPSD #1, a Department of the Iberia Parish Government). George Glaubrecht and Chris Richard, (DS&A) met with City of New Iberia, Wastewater Department Director Vince Palumbo, and Anita Boudreaux, Executive Director of Iberia Parish Sewerage District No. 1, to discuss existing conditions, need for improvements, and past history of construction and reports related to the problem area.

DS&A subsequently met in the field with the City's selected Geotechnical Engineers (Eustis Engineering, represented by Shaun Simon) to discuss the study and report further and request documents resulting from past designs and investigation of the levees due to past failures. DS&A requested and received old plans and specifications, past failure reports, and some (not all documentation was available) construction documentation related to original construction of the Basin and subsequent repair construction undertaken in response to failures in the original Basin levees. The failure report by Site Engineering (not the geotechnical engineering firm for the original construction) briefly summarized findings of that firm based on work they were apparently hired by the Parish to perform in conjunction with observed levee problems that arose sometime after the completion of the original construction.

Field and investigative work included DS&A and Eustis Engineering performing a visual site inspection of surface conditions of the levees and the taking of photographs initially. Subsequently, DS&A subcontracted with Paul C. Prince, LLC to perform a topographic survey of the Basin and gather cross section information on the levees for use by the geotechnical engineers in studying and evaluating the observed failures. The topographic and cross section survey information is incorporated into several of the Engineering drawings and exhibits that are part of this report.

Analyses of the soils and survey data along with historical information provided by Client were used to develop an opinion on the causes of the recurring failures and to propose options for remedial measures to address the problems being experienced.

This Study discusses an option for completely reconstructing the levee features of the Basin and an option for partial reconstruction of the worst areas of the levees in a phased manner. The recommended option to reconstruct the levees completely, while the least risky of options, is also the most costly option. The option of reconstructing or partially reconstructing only portions of the levees would be less costly initially but would be more risky and would carry some of the same risks as earlier repairs which eventually failed.

Geotechnical Engineers weren't able to model the failure mechanisms at first using the tested shear strengths. This led them to adjust assumptions such that the soil was in a weakened state and that this was a contributing factor in the failures. Having the shape of the failure zones, survey data, old aerial data, etc. allowed the Geotechnical Engineers to model those failures and back their way into a set of weakened soil parameters. The stability berm was then sized using those parameters so that the entire levee section wouldn't have to be degraded back to original grade. A higher factor of safety was not applied due to any uncertainty. The Geotechnical Engineers were able to model the failures (Factor of Safety of 1.0) using weakened soil parameters and the available data and then they were able to develop a solution to provide for the required factor of safety of 1.4.

Unfortunately, the science of these types of earthen structures is somewhat inexact and "factors of safety" provide an indication of the relative assurance of the success of each type of repair or reconstruction. Lower factors of safety indicate higher risk and greater likelihood of future problems. The matter is one of balancing costs with risks. This report recommends the complete reconstruction due to the past experience and likelihood of future failures associated with partial repairs and/or reconstructions. That being said, while the Geotechnical Engineers do not recommend re-use of existing levee materials (even that which was brought in for repairs subsequent to original construction), there may be some compromises which the Owners can make to further reduce costs while increasing risks. During Final Planning, if the Options presented in this report are still beyond budget constraints, the Owners may decide to forego removal of top of levee section in unfailed areas. Geotechnical Engineers are of the opinion that if you place the stability berms in areas that haven't failed, there isn't an immediate need to replace the upper levee material. This is based on a number of assumptions, the most significant being that those upper levee materials are in an unfailed, stable, and sound condition. If those materials are left in place after the berms are installed, there is a risk that the levees experience upper levee failures resulting from erosion type mechanisms. There may be erosion valleys in the face of the levee not seen through the grass. There may be roots or other embedded weak areas. So while there might not be a large type failure the upper levee areas may still need repair. This results in a "fix now or fix later" issue that has significant cost association. DSA is also concerned that there may be a perception issue where the Owners may assume that there will be no more issues once the berms are in place. If these types of repairs are considered for further cost savings, Owners will have to understand that there may be issues if the upper materials are not replaced. Geotechnical Engineers feel that these would be more maintenance type, surficial repairs, than large failures. They would, however, represent additional costs, possibly at inopportune times.

If the upper materials don't have any of the above issues (it is difficult to know given the limited testing and scope of this report), the stability berms should solve the problem. The stability berms solve the problem using the soils in a weakened state, so any improvements to a failed section only makes the factor of safety higher.

Conceptual phase project cost for the option recommended in this report is estimated at **$9.4 Million**. Costs can be adjusted by making modifications to the scope of the work and will require further adjustment based on more detailed information as the project scope is better defined in the formal planning and design phases.

Once the recommendations or parts of the recommendations of this report are agreed upon or otherwise established by the affected governmental entities (Iberia Parish Sewerage District No. 1 and the City of New Iberia), the Consultant should be instructed to conduct field work and prepare preliminary plans for the construction required to address the general goals outlined as a result of the pre-design meetings. Further meetings and review of those documents should proceed toward the end result of preparing a final approvable set of Construction Contract Documents.

The Design Process should not commence until there is agreement on the final scope, project scheduling, and the funding requirements associated with the work anticipated by pre-design agreements.

It is important to note that a formal, structured program of inspection and ongoing maintenance of levees is critical to maintaining the integrity of the levees. This will be no different after improvements are constructed. Cutting of grass on the slopes, maintenance of observed erosion issues and operations related to water levels and the speed of drawdowns are all critical to long term performance of the levees. The appropriate government entity (City of New Iberia or Iberia Parish Sewerage District No. 1) should implement a formal inspection and maintenance program to help ensure that these measures are reliably followed on a periodic and ongoing basis.

## II. INTRODUCTION

The observations, information gathering, analyses and resulting report are intended to give the City a general idea of the causes of existing levee problems at the Tete Bayou WWTP Equalization Basin and to explore possible solutions to observed problems. The report is also intended to outline risks and costs associated with possible solutions and to summarize the process for implementing planned improvements with regard to ongoing use of the Basin for its intended purpose while repairs or reconstruction are underway.

No formal detailed designs were performed for this report. DS&A relied on copies of plans, specifications, reports and other information on the existing Equalization Basin facility provided by the City of New Iberia; IPSD #1; Freyou, Moore and Assoc., Inc.; Site Engineering, Inc.; Louisiana Testing and Inspection, Inc.; and various other inspection reports and correspondence for an overview of the existing facilities and augmented that information with field data collected by DS&A, Eustis Engineering, and Paul C. Prince, LLC. specifically for this report.

Included in the report are engineering drawings and narrative descriptions of possible remedies to the observed or anticipated problems. Detailed plans, specifications and contract documents should be prepared if the City and IPSD #1 decide to proceed with the recommended reconstruction or repairs. The attached drawings are for informational purposes and are intended to convey a general approach to solving problems and addressing the current problems. These drawings are the basis for the concept level construction cost estimates included in this report. More refined details, calculations, and formal documents are required for actual construction. Estimates based on formal drawings will, of course, be more accurate.

## III. SCOPE OF REPORT

### A. Purpose

A scope of the study requested is included in the Contract between DSA and The City of New Iberia.

In general, the purpose of the study is to evaluate the levee failures at the Tete Bayou WWTP Equalization Basin in Iberia Parish for the purpose of determining options for modifications or reconstruction to address the problems currently being experienced with that facility. The following paragraphs discuss the specific scope items in more detail.

### B. Procedures

**Investigate existing levee problems:**

The study contract requires investigation of the levee failures (slope stability) at the existing Equalization Basin at the Tete Bayou WWTP in Iberia Parish, LA. DSA conducted site visits, gathered topographic information using subcontracted field crews and gathered plans, specifications, past reports and construction information on the original facility and subsequent past repairs as available from local government agencies (IPSD #1 and the City of New Iberia Wastewater Dept.). The City of New Iberia furnished planning documents and prior failure reports in addition to photographs and assistance with preliminary site visits. Eustis Engineering, geotechnical engineering consultants contracted by the City of New Iberia, conducted site visits, soil borings and lab analyses which formed the basis of their report – which is attached to this Report as Appendix I.

**Conduct Field Surveying:**

DS&A subconsultant, Paul C. Prince, LLC conducted limited topographic reconnaissance and cross section survey information gathering in conjunction with this study due to the fact that certain information important to the analysis of the failures was not available in the information gathered initially since the recent failures were subsequent to the information available. The cross section data was needed by Eustis for the purpose of analyzing slope stability as well as for use in preparing conceptual approaches to reconstructing and/or repairing the levees.

**Evaluate Environmental Issues:**

Included in this study are comments on the environmental issues associated with both proposed improvements and possible existing environmental issues that should be addressed as part of the improvement planning process. Possible issues for consideration are stormwater pollution prevention and erosion control requirements and permitting during construction; wetlands disturbance and spoil deposition governed by US Army COE 404 permits; and discussion of other potential environmental impacts of the anticipated improvements. This basin was constructed under consent decree by the US EPA who was joined in that action by the Louisiana DEQ. Phasing of repairs or reconstruction will be required to keep the facility, or portions of it operational during construction in order to maintain the capability of the WWTP to bypass excessive flows during rain events to the Basin in order to avoid overloading the WWTP and causing excursions.

**Geotechnical Analyses and Proposed Solutions:**

Computer models of existing levees and proposed solutions were analyzed by Eustis Engineering using GEO-SLOPE International, Ltd.'s program SLOPE/W 20L6, Version 8.L6.L.L3452. See Appendix X for Eustis Engineering Report. Based on proposed solution options presented in the Eustis Report, DSA prepared concept level sketches, X-sections, and cost estimates for the solution options. The Geotechnical Engineering Report explains methodology, analyses, and opinions on the causes of the observed failures.

**Compare Options:**

Solution options were evaluated for cost based on life cycle cost - using present worth analyses to estimate the present worth of future operations, maintenance and replacement costs associated with the various options in addition to initial proposed construction, design, and related phasing and operation costs. Intangible advantages and disadvantages of the options are discussed in the body of the report as well as in tabular form (impacts on existing operations, potential for regulatory excursions, logistics, risks of recurring failures, reliability, and functional efficacy, etc.).

**Make Recommendations:**

Recommendations contained in this report were made based on quantitative measures such as cost analyses, as well as qualitative judgments regarding problems in achieving the desired end result; funding availability (discussed with Clients); and efficacy (how well or reliably each option will achieve the desired results).

## IV. OBSERVATIONS

### A. Compilation of Existing Information

DSA requested and received old plans and specifications, past failure reports, and some (not all documentation was available) construction documentation related to original construction of the Basin and subsequent repair construction undertaken in response to failures in the original Basin levees. Original Plans and Specifications for construction of the Basin were prepared by Freyou, Moore & Assoc., Inc. with an original geotechnical engineering report provided by Louisiana Testing and Inspection, Inc. Subsequent failure repair plans were likewise prepared by Freyou, Moore & Assoc., Inc. with a geotechnical engineering report prepared by Site Engineering, Inc. The failure report by Site Engineering (not the geotechnical engineering firm for the original construction) briefly summarized findings of that firm based on work they were apparently hired by the Parish to perform in conjunction with observed levee problems that arose sometime after the completion of the original construction. Other miscellaneous data on testing and inspection during original and repair construction was sparse and incomplete.

### B. Field Work – Surveys & Geotechnical

DSA subsequently met in the field with the City's selected Geotechnical Engineers (Eustis Engineering, represented by Shaun Simon) to discuss the study and report further.
Field and investigative work included DS&A and Eustis Engineering performing a visual site inspection of surface conditions of the levees and the taking of photographs initially. Subsequently, DSA subcontracted with Paul C. Prince, LLC to perform a topographic survey of the Basin and gather cross section information on the levees for use by the geotechnical engineers in studying and evaluating the observed failures. The topographic and cross section survey information is incorporated into several of the Engineering drawings and exhibits that are part of this report.

Analyses of the soils and survey data along with historical information provided by Client were used to develop an opinion on the causes of the recurring failures and to propose options for remedial measures to address the problems being experienced.

## V. EVALUATION OF EXISTING LEVEE CONDITION

### A. Slope Failures – History & Current Conditions

The original Equalization Basin was constructed in 2004-2005 by R.J. Broussard Contractors at a cost of $600,000 to $700,000 and consists of approximately 6 acres top area with a perimeter levee of about 2,300 linear feet. The Basin has a capacity of approximately 27 million gallons storage.

Around January or February of 2012, Freyou, Moore inspected the levees, presumably on reports of levee failures. In July of 2012, Site Engineering, Inc. issued a report on the levee failures at the Tete Bayou WWTP "Equalization Pond". Engineering estimate for the "step" repair of the levees was $317,000 including planning and construction. In February of 2013, a construction contract was awarded to Southern Constructors, LLC in the amount of $383,000 and the repair project was accepted as complete in October of 2013. [In March of 2013, the City and IPSD #1 entered a supplemental intergovernmental agreement to fund engineering and construction to repair the levee failures.]

In June of 2014, Freyou Moore once again inspected the Equalization Basin and found "new cracks" that were outside the area of the recent repair project. Freyou Moore recommended monitoring of the cracks and a long term maintenance program.

The request in June or July of 2017 for DSA and Eustis to investigate and report on the most recent failures is the result of a progression of failures over time as the City and IPSD #1 had been monitoring the problem areas on recommendation of Freyou, Moore.

**B. O&M Issues**

Continued monitoring and repairing of erosion or minor levee defects will be required. Mowing of side slopes (without scalping or cutting vegetation too short) is good practice for maintaining earthen levees to avoid tree growth in levees and to maintain healthy grass with root systems helpful at controlling surface erosion. Observation and elimination of nuisance animal damage (alligator or nutria holes, etc.) will also be necessary.

**C. Function and Risks of inaction**

The repairs recommended in the geotechnical engineering report are necessary to preclude further progression of existing failures and anticipated development of additional failures. The failures on the north end of the basin are particularly severe and could eventually result in breach of the containment levees during high water events. Breach of the basin levees would result in discharge of wastewater to adjacent waterways with all manner of detrimental environmental consequences.

While total failure has not occurred over several years after initial observation of the problems, lack of action will almost certainly result in undesirable consequences in time.

The recommended repairs will result in a diminished overall capacity of the Equalization Basin due to the fact that the "toe" construction will occupy part of the interior volume of the basin that was once available for storage. Initial estimates are that approximately 5 million gallons of capacity would be lost (from 27 million to 22 million gallons capacity) due to the repair scheme.

### D. Geotechnical Engineering Report

See Appendix X.

## VI. COMPARISON OF ALTERNATIVES & RECOMMENDATIONS

### A. List of Options

Based on a review of field conditions, prior studies/reports, Eustis Engineering's Geotechnical Report and DSA input regarding possible solutions to the observed levee problems at the subject Equalization Basin, the following options were studied as possible alternatives to solving the levee problems:

Option 1– Completely Reconstruct the Levees around the Equalization Basin. This option would require phasing to maintain partial function of the Basin for protection against WWTP excursions during rain events and high plant flows. This option would require significant modifications and working around associated equipment (pumping station, force main, aeration equipment and associated electrical equipment. Subsequent to completion of this option, all levees would be converted to 4H:1V interior side slopes whereas currently, only the south and east levees meet this side slope since they were reconstructed to the flatter slope as part of earlier repairs. The north and west levees are currently approximately 3H:1V interior sideslopes per initial designs and construction.

Option 2– Construct repairs or reconstruction to only the north and west levee areas of the Basin currently experiencing significant failures and/or having steeper interior sideslopes. This option would be less costly initially but still problematic for maintaining function of the Basin; however, this option would be more likely to result in significant additional repair costs within the short term future. Such repair costs could be in areas not addressed by the repairs of this option, or even within the areas repaired under this option due to the possibility of adjacent failures affecting work done within this option.

**B. Schematics of Various Solutions**

Option 1 - Exhibit D shows a plan indicative of the type of repairs representative of Option #1.

Option 2 - Exhibit E shows a plan indicative of the type of repairs representative of Option #2.

**C. Discussion of Alternatives**

Option 1– To make long term, more reliable repairs with a less risky factor of safety, Option 1 requires complete removal of the materials used to construct the Equalization Basin Levees and replacement of those materials with select off site materials that would produce more stable levees with a higher factor of safety. Due to space limitations, the geometry (area and exterior side slopes of levees) would be maintained almost identical to the existing levees. The south and west levees that were more recently repaired have a rough side slope inside the basin of 4 horizontal to 1 vertical (4H:1V). The north and west levees that were not part of recent repairs had internal side slopes of more or less 3 horizontal to 1 vertical (3H:1V), but would have to be re-shaped to 4H:1V to meet requirements of the geotechnical engineering report for repairs. This option involves significant costs to remove and dispose of existing levee materials and to bring in offsite select materials to create a new levee. The bottom "muck" would have to be replaced by limestone to a certain level in order to accomplish compaction on higher lifts in the "dry". This option would also include significant costs associated with phasing the project to maintain partial function and significant costs associated with removal and reinstallation of equipment (aerators, electrical, etc.). Another cost related to this option is the reconstruction of the part of the Plant perimeter road that would be used as a haul route. It would likely be damaged beyond repair and require reconstruction subsequent to the levee reconstruction project.

Option 2– To make short term, less reliable repairs with less long term reliability, Option 2 involves only partial repair of the levees (full repair of only certain stretches of the levee) using the recommended section. This option involves significantly less costs associated with removal and disposal of existing levee materials and borrow from offsite sources to partially repair the existing levees. This option would also include fewer costs associated with removal and reinstallation of equipment (aerators, electrical, etc.). This Option would still require cost for the reconstruction of the part of the Plant perimeter road that would be used as a haul route. While this Option may be attractive from a standpoint of lower initial capital costs, it is quite risky and may result in the City and IPSD #1 being in the same situation again several years after these repairs are made. This Option can be thought of as a continued maintenance through construction and would likely result in similar required projects on a recurring basis with similar times between failures as has been experienced thus far on this facility. This option is a fallback position to be taken only if the large initial capital expenditure to undertake Option #1 cannot be done. In other words, this Option is better than doing nothing, but is far from ideal and would require a commitment of future ongoing funding for maintenance beyond simple grass cutting and erosion control. The maintenance associated with this Option will likely require significant (albeit lower than Option #1) construction costs on an ongoing basis every 5 to 10 years in addition to the ongoing annual expenditures for grass and slope maintenance. This Option would also require much more care and strict control over the timing and rate at which drawdowns are conducted (although this would be good practice with either option).

If Option 2 is still not manageable from a budget standpoint, it may be necessary to reduce the scope of Option 2 further to meet budget constraints. This could be done as part of scope definition for the project and would likely involve at a minimum, addressing the north levee which is in the worst condition and which is most likely to fail completely with continued lack of repairs. The west levee, which is not at the proposed 4H:1V internal side slope could be delayed for some time and monitored for signs of distress (it currently shows less slope issues and certainly much less severe slope issues than the north levee).

## D. Concept Level Cost Analyses

The following tables represent concept level cost estimates for each option. Section VI, of this report also includes tables showing present worth analyses of future O&M costs in order to account for life cycle costs associated with each option to offer a fair assessment of each option for comparison purposes.

**TABLE 1: OPTION 1 - Total Levee Reconstruction COST ESTIMATE**

| Item No. | Description | Quantity | Unit | Unit Price | Extension |
|---|---|---|---|---|---|
| 1 | Temporary cofferdam to maintain function | 13,000 | cu. yds. | $15.00 | $195,000.00 |
| 2 | Temporary Relocation of aerators/electrical | 1 | lump | $50,000.00 | $50,000.00 |
| 3 | Temporary Piping modifications to Pump Sta. | 1 | lump | $25,000.00 | $25,000.00 |
| 4 | Clearing and grubbing of trees, debris | 1 | lump | $75,000.00 | $75,000.00 |
| 5 | Removal and onsite disposal of existing levees | 56,000 | cu. yds. | $10.00 | $560,000.00 |
| 6 | Removal and offsite disposal of existing levees | 16,000 | cu. yds. | $116.00 | $1,856,000.00 |
| 7 | Select Borrow from offsite | 83,000 | cu. yds. | $8.00 | $664,000.00 |
| 8 | Limestone base under toe | 38,016 | ton | $55.00 | $2,090,880.00 |
| 9 | Placement & Compaction of new levees | 83,000 | cu. yds. | $11.00 | $913,000.00 |
| 10 | Erosion control, seeding, fertilizing, etc. | 1 | lump | $75,000.00 | $75,000.00 |
| 11 | Re-install aerators/electrical | 1 | lump | $70,000.00 | $70,000.00 |
| 12 | Removal of temporary piping to pump sta. | 1 | lump | $20,000.00 | $20,000.00 |
| 13 | Removal of temporary cofferdam & final mucking | 1 | lump | $100,000.00 | $100,000.00 |
| 14 | Reconstruction of Plant Drives | 1 | lump | $150,000.00 | $150,000.00 |
| 15 | Temporary Sheeting | 10,000 | sq. ft. | $25.00 | $250,000.00 |
| 16 | Dewatering | 1 | Lump | $50,000.00 | $50,000.00 |
| 17 | Mobilization, insurance, bond, staking, misc. | 1 | Lump | $250,000.00 | $250,000.00 |
| | SUBTOTAL | | | | **$7,393,880.00** |
| | Contingencies | | | | $740,000.00 |
| | ESTIMATED TOTAL CONSTRUCTION COST | | | | $8,133,880.00 |
| | Land Acquisition, Easements, Servitudes | | | | $5,000.00 |
| | Legal Fees | | | | $10,000.00 |
| | Permiting, Environmental, Etc. | | | | $25,000.00 |
| | Engineering, Inspection, Testing | | | | $1,221,000.00 |
| | **ESTIMATED TOTAL ROUNDED PROJECT COST** | | | | **$9,395,000.00** |

## TABLE 2: OPTION 2 - Partial Levee Reconstr./Repair COST ESTIMATE

| Item No. | Description | Quantity | Unit | Unit Price | Extension |
|---|---|---|---|---|---|
| 1 | Temporary cofferdam to maintain function | 19,500 | cu. yds. | $15.00 | $292,500.00 |
| 2 | Temporary Relocation of aerators/electrical | 1 | lump | $20,000.00 | $20,000.00 |
| 3 | Temporary Piping modifications to Pump Sta. | 1 | lump | $22,000.00 | $22,000.00 |
| 4 | Clearing and grubbing of trees, debris | 1 | lump | $34,090.91 | $34,090.91 |
| 5 | Removal and onsite disposal of existing levees | 25,455 | cu. yds. | $10.00 | $254,545.45 |
| 6 | Removal and offsite disposal of existing levees | 7,273 | cu. yds. | $116.00 | $843,636.36 |
| 7 | Select Borrow from offsite | 37,727 | cu. yds. | $8.00 | $301,818.18 |
| 8 | Limestone base under toe | 17,280 | ton | $55.00 | $950,400.00 |
| 9 | Placement & Compaction of new levees | 37,727 | cu. yds. | $11.00 | $415,000.00 |
| 10 | Erosion control, seeding, fertilizing, etc. | 1 | lump | $34,000.00 | $34,000.00 |
| 11 | Re-install aerators/electrical | 1 | lump | $28,000.00 | $28,000.00 |
| 12 | Removal of temporary piping to pump sta. | 1 | lump | $18,000.00 | $18,000.00 |
| 13 | Removal of temporary cofferdam & final mucking | 1 | lump | $150,000.00 | $150,000.00 |
| 14 | Reconstruction of Plant Drives | 1 | lump | $150,000.00 | $150,000.00 |
| 15 | Temporary Sheeting | 5,000 | sq. ft. | $25.00 | $125,000.00 |
| 16 | Dewatering | 1 | Lump | $25,000.00 | $25,000.00 |
| 17 | Mobilization, insurance, bond, staking, misc. | 1 | Lump | $130,000.00 | $130,000.00 |
| | SUBTOTAL | | | | **$3,793,990.91** |
| | Contingencies | | | | $380,000.00 |
| | ESTIMATED TOTAL CONSTRUCTION COST | | | | $4,173,990.91 |
| | Land Acquisition, Easements, Servitudes | | | | $5,000.00 |
| | Legal Fees | | | | $10,000.00 |
| | Permiting, Environmental, Etc. | | | | $25,000.00 |
| | Engineering, Inspection, Testing | | | | $627,000.00 |
| | **ESTIMATED TOTAL ROUNDED PROJECT COST** | | | | **$4,841,000.00** |

**Table 3 - Initial Capital Costs**

| Option 1<br>(See Table 1) | Option 2<br>(See Table 2) |
|---|---|
| $9,395,000 | $4,841,000 |

## Table 4 - Annual O & M Costs

| | Item | Unit | Unit Cost | Option 1 | | Option 2 | |
|---|---|---|---|---|---|---|---|
| | | | | Qty. | Cost | Qty. | Cost |
| | Grass Cutting | Lump | $6,000 | 1.00 | $6,000 | 1.00 | $6,000 |
| | Spraying | acre | $3,000 | 6.00 | $18,000 | 6.00 | $18,000 |
| | Erosion Repairs | Lump | $5,000 | 1.00 | $5,000 | 1.00 | $5,000 |
| | Removal of branches and debris | Lump | $12,000 | 1.00 | $12,000 | 1.00 | $12,000 |
| | Limestone Drive Maintenance | Lump | $2,000 | 1.00 | $2,000 | 1.00 | $2,000 |
| | Sludge/sediment maint. | Lump | $1,000 | 1.00 | $1,000 | 1.00 | $1,000 |
| | Nuisance animals/aquatic growth | Lump | $1,000 | 1.00 | $1,000 | 1.00 | $1,000 |
| 1 | Slope Stability Maint. | Lump | $160,000 | 0.00 | $0 | 1.00 | $160,000 |
| | Misc., access, security, etc. | Lump | $1,000 | 1.00 | $1,000 | 1.00 | $1,000 |
| | Total | | | | $46,000 | | $206,000 |

1 - Assumes every 5 years req. approx. $800,000 under option 2. Annual cost = $800,000/5

## Table 5 - Future Replacement Costs

| Item | Useful Life, Years | Option 1 Current Capital Cost | Option 2 Current Capital Cost |
|---|---|---|---|
| Pumps, Motors, Aerators, etc. | 25 | $250,000 | $250,000 |
| Equalization Basin | 50 | $4,697,500 | $9,395,000 |
| | | | |
| * 50-year Total | | $4,697,500 | $9,395,000 |
| * 25-year Total | | $250,000 | $250,000 |

* - Current dollars.  The 25-year life items will be replaced after 25 years and again after 50 years.

## Table 6 - Life Cycle Cost Comparison

| Option | Initial Capital Costs | Annual O&M Costs 50-year | | Replacement Costs 25-year | | Replacement Costs 50-year | | Total Present Value of all Costs |
|---|---|---|---|---|---|---|---|---|
| | Current=NPV | Annual Cost in Current Dollars | Present Value for a Discount Rate of 2% | Future Replacement Cost in Current Dollars | Present Value for a Discount Rate of 2% | Future Replacement Cost in Current Dollars | Present Value for a Discount Rate of 2% | |
| Option 1 | $9,395,000 | $46,000 | $1,445,486 | $250,000 | $152,383 | $4,697,500 | $1,745,252 | $12,738,121 |
| Option 2 | $4,841,000 | $206,000 | $6,473,263 | $250,000 | $152,383 | $9,395,000 | $3,490,504 | $14,957,150 |

## Table 7 - Ranking of Options

| Option | Life Cycle Cost (20 Points) | | Reliability & Efficacy (20 Points) | | Schedule (10 Points) | | Permitting & Environmental Issues (5 Points) | | Land or Servitude Acquisition (5 Points) | | Total Point Score (60 Points) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Life Cycle Cost | Point Score | Relative Ranking | Point Score | Relative Ranking | Point Score | Relative Ranking | Point Score | Relative Ranking | Point Score | |
| Option 1 | $12,738,121 | 20.0 | Good | 16 | 1 to 2 years | 5 | Moderate to Easy | 3 | Easy | 4.5 | 48.5 |
| Option 2 | $14,957,150 | 17.0 | Poor | 2 | <1 year | 10 | Easy | 4.5 | Easy | 4.5 | 38.0 |

## E. Permits and Regulatory Compliance

The following regulatory agencies may require compliance with various local, state, and federal regulations applicable to the work described in the various solution options outlined in this report:

The U.S. Army Corps of Engineers and United States Environmental Protection Agency jointly administer the program established by Section 404 of the Clean Water Act of 1972 restricting deposition of dredged or fill material in certain areas (primarily wetlands). Wetlands delineations may be required for any options in which such activities may occur.

The State of Louisiana Department of Environmental Quality (LA DEQ) may have involvement in work of certain options depending on discovery of unanticipated materials during construction (e.g., buried tires or batteries) or in conjunction with their role as US EPA partners in enforcement of federal environmental regulations. LA DEQ may have input on discharges into the Tete Bayou that relate to the Watershed Protection Program.

The State of Louisiana Department of Natural Resources may be involved in letters of no objection or matters related to their Coastal Restoration initiatives, estuarine conservation efforts, Coastal Use Permitting, and similar natural resource issues related to Tete Bayou.

Local permitting for traffic interruption during hauling operations, and similar construction activities would be handled through the appropriate local authorities (Parish or City of New Iberia as applicable).

The State of Louisiana Department of Wildlife and Fisheries may be required to issue letters of no objection relative to construction clearing adjacent to the Tete Bayou.

## F. Discussion of Advantages/Disadvantages of Options

The Table included as Exhibit H summarizes both quantitative and qualitative advantages and disadvantages of the options outlined in this report.

### Life Cycle Cost Analysis

The life cycle cost analysis for each option includes the following cost elements:

a) Initial Capital Costs
b) Annual operations and maintenance (O&M) costs
c) Facilities and/or equipment replacement costs

The development of these costs is described below, followed by a summary of the life cycle costs. Note that using a “discount rate” that takes account of both interest and inflation allows the use of constant, or today’s, dollars in the analysis. When using a discount rate, it must be noted that the results are artificial values on the total cost of ownership. The results are not the actual dollars that would be needed; as such, they can only be used for *comparison* purposes, not for determining actual cost over the life of the option.

**Initial Capital Costs**

Initial capital costs of each option are shown in Tables 1 and 2 and summarized in Table 3. These costs are in current dollars (2017).

**Annual O&M Costs**

Development of O&M costs for the various options is based on DSA experience with similar facilities and experience of other municipalities that own similar facilities. In some cases, the O&M costs used in this report represent the level of O&M that should be applied (in some instances used for reference, some maintenance is routinely deferred due to lack of funding or inattention) as opposed to what is actually done.

Option 1 – Complete Reconstruction of the Equalization Basin operation and maintenance consists generally of grass cutting, spraying, erosion repairs, removal of branches and debris, limestone drive maintenance, long term maintenance of sludge/sediment, nuisance animals, aquatic growth in the Basin and miscellaneous maintenance associated with servitudes, signs and access (security).

Option 2 – Partial Repairs to the Equalization Basin operation and maintenance consists generally of the same items as Option 1 (grass cutting, spraying, erosion repairs, removal of branches and debris, limestone drive maintenance, long term maintenance of sludge/sediment, nuisance animals, aquatic growth in the Basin and miscellaneous maintenance associated with servitudes, signs and access), but with additional construction maintenance costs every 5 years or so due to the anticipated ongoing slope stability issues.

**Replacement Costs**

Replacement costs are deemed to be equal for both Options, therefore they are equal for comparison purposes. The analysis period was set at 50 years as a reasonable time for expected useful life of the facility. Note that for Option 1, the 50 year replacement cost would be only about half that for Option 2 which would basically require reconstruction from scratch (Option 1 would be almost a complete rebuild currently, so it would cost less to replace in 50 years).

These costs are in current dollars.

**Life Cycle Cost Summary**

A summary of the life cycle costs is presented in Table 6. The initial capital costs are directly from Table 3. The present value of 50 years of O&M cost was calculated assuming a discount rate of 2 percent, according to the following formula:

$$i_{discount} = \frac{(i_{interest} - i_{inflation})}{(1 + i_{inflation})} \quad \text{, where}$$

$i_{discount}$ = discount interest rate

$i_{interest}$ = interest rate (cost of borrowing, municipal bond rate ≈ 5%)

$i_{inflation}$ = inflation rate (historically around 3%)

The present values of future replacement costs were calculated and summarized in Table 6 (future replacement costs are shown in Table 5), using a discount rate of 2 percent. For each option, the total present value of all of the individual present value costs is also shown in Table 6.

**Ranking Of Options**

Table H is a summary comparison of significant issues related to the options. The comparison includes qualitative comments on reliability, efficacy, land issues, environmental, safety, scheduling and several other related issues.

Table 7 is a point ranking of alternatives based on the most critical issues. The top row of Table 7 indicates the points assigned to each issue, with higher points indicating higher importance. Reliability and Life Cycle Cost were given the highest point values (20 points each). Permitting and environmental issues were assigned 5 points, as was ongoing functionality and excursion risk. Schedule was assigned a value of 10 points.

For each issue and option, the basis of the point score is shown along with the assigned point score. Higher point scores are better than lower point scores. For example, Option 1 has the lowest life cycle cost of the options and it was assigned a score of 20 points. Option 2 has a life cycle cost that is more than Option 1 so it received a score of 17 points (roughly 85.2% of the score of Option 1 since Option 1 life cycle cost is roughly 85.2% that of Option 2).

For issues judged based on qualitative comparison, scores were assigned based on judgment of the relative values of the respective qualitative rankings.

The maximum possible total score for any option would be 60 points. For each option, the point scores are totaled in the far right column of Table 7, with higher scores being better than lower scores. As shown, Option 1 has the highest point total and is thus the preferred Option.

## G.  Recommendations

Evaluation of alternatives presented in this report indicates that Option 1 is the most favorable option in terms of life cycle cost, reliability, and overall cost/benefit ratio. The Iberia Parish Sewerage District No. 1 and the City of New Iberia should review this report, as well as other referenced documents and previous reports, and come to some agreement on the scope, schedule, and funding of a project that would achieve their goals for restoring the levees and long term reliability of their Equalization Basin.  DSA is available to discuss the contents of this report and assist in reaching some consensus prior to proceeding further in the process toward correcting or mitigating the levee problems at the subject facility.  It is also important that the employees who operate and maintain the facility be included in the discussion at some level.  While total agreement on any option by operations and maintenance personnel may be unlikely, their comments may prove useful and may provide valuable insight into issues that might otherwise be overlooked.  It is also important that they cooperate in the ongoing maintenance required to make any option successful in the long term.  The next step would be to contract with engineers for preparation of project specifications, contract drawings, and bidding documents to allow for competitive bidding of a project for construction of the agreed upon solution or portions thereof.

It is important to note that a formal, structured program of inspection and ongoing maintenance of the levees is critical to maintaining the stability of the levees.  This will be no different after improvements are constructed.  The appropriate government entity (City of New Iberia or IPSD #1, as applicable) should enact policies that require strict adherence to an inspection and maintenance program that will help to avoid growth of small problems into larger, more costly problems if ignored.

## VII. CONCLUSIONS

Evaluation of alternatives presented in this report indicates that Option 1 is the most favorable option in terms of life cycle cost, reliability, and overall cost/benefit. In the event that full funding of Option 1 is not feasible, Option 2 could be pursued with the long term goal of eventually repairing all sections of the levees and consistent budgeting and repairs to avoid more serious degradation of levees similar to that which now exists. Of course, some economies of scale and timing would be sacrificed by phasing the project as such and recurrence of the disruption caused by construction would be undesirable. Nonetheless, it is a step in the right direction if funding cannot be made available to do all of the work recommended for Option 1 and would provide some risk protection, if not to the level that Option 1 would provide.

While Option 1, the totally reconstructed levee, would provide better and more reliable long term performance of the levees, it would come at a high initial cost along with the need for more costly temporary construction measures in order to maintain functionality. Reliability of such levees is related to the greater stability of the more expensive materials (and associated removal of the less desirable existing materials). Lastly, the potentially catastrophic results of a breach of the levees from an environmental standpoint cannot be overstated. For this reason alone, any decision to go with Option 2 must be carefully weighed with a full commitment to ongoing future repair projects and meticulous attention to ongoing levee maintenance.

The planning process for implementing the construction of either Option must begin with a thorough review of this report and pre-design meetings to reach consensus on the path forward. Once the recommendations or parts of the recommendations are agreed upon, a Consultant should be contracted to prepare concept level plans for the facility to address details of the design required to achieve the general goals outlined as a result of the pre-design meetings. Further meetings and review of those documents should proceed toward the end of constructing a final approvable Concept Level Document.

The Design Process should not commence until there is agreement on the final concept documents, project scheduling and the funding requirements associated with the scope of work anticipated by that document.

## VIII. DISCUSSION OF COST ESTIMATE OF RECOMMENDED OPTION

The cost estimate that follows is based on commencing work on the recommended construction work (Option 1) within 12 months after the date of issuance of this report. Inflation factors and construction cost indices would need to be used to adjust the figures for any time period for which the construction is delayed. DSA is not aware of any reliable way to project future construction costs, especially given the recent volatility in construction markets. The cost information contained in this estimate was prepared using information on other projects with similar work items, discussions with local contractors, and LA DOTD standard item files with information on unit pricing. Where quantities were significantly different from those represented in LA DOTD standard item files, unit prices were adjusted based on our engineering judgment. DSA also relied on cost information from similar past construction projects that our firm has engineered for other municipal clients.

Since the engineer has no control over the cost of labor, materials, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, his opinions of probable Project Cost and Construction Cost provided herein are made on the basis of his experience and qualifications and represent his best judgment as an experienced and qualified professional engineer familiar with the construction industry; but the engineer cannot and does not guarantee that proposals, bids, or actual Project or Construction Cost will not vary from Opinions of Probable Cost prepared by him.

Construction cost for the recommended alternative is $8,134,000 including 10% for contingencies, which is typical at the conceptual stage. Engineering costs for preparing construction documents, assisting with receipt of bids, administering construction, testing and inspection should be budgeted at approximately $1,220,000 (approx. 15%). Engineering costs do not include permitting, right of way acquisition, abstracting, surveying or other services typically considered as additional services or reimbursable expenses. Budget numbers for permitting, legal, and abstracting and servitude concurrence acquisition are included in the estimate at $25,000, $10,000, and $5,000 respectively, but should be verified with the parties anticipated to carry out those tasks. DS&A will meet with the Client to discuss terms for performing the engineering services if a decision is made to proceed with all or part of the recommendations contained in this report. Refer to Table 1 for a summary of these budget costs.

## IX. PHOTOGRAPHS

**PHOTOGRAPH 1 –** Slope Failure South Levee Looking West

**PHOTOGRAPH 2 –** Slope Failure South Levee Looking East

**PHOTOGRAPH 3 –** Slope Failure East Levee Looking North


**PHOTOGRAPH 4 –** Slope Failure East Levee Looking East

**PHOTOGRAPH 5 –** Slope Failure South Levee Looking East

## ENGINEERING DRAWINGS & EXHIBITS

A. Existing Site Plan (from Survey Topo)
B. Existing Cross Sections
C. Aerial Photo
D. Schematic Plan – Option 1
E. Schematic Plan – Option 2
F. Aerial Photo Showing Spoil Area
G. Typical Levee Repair Section
H. Table of Option Comparisons

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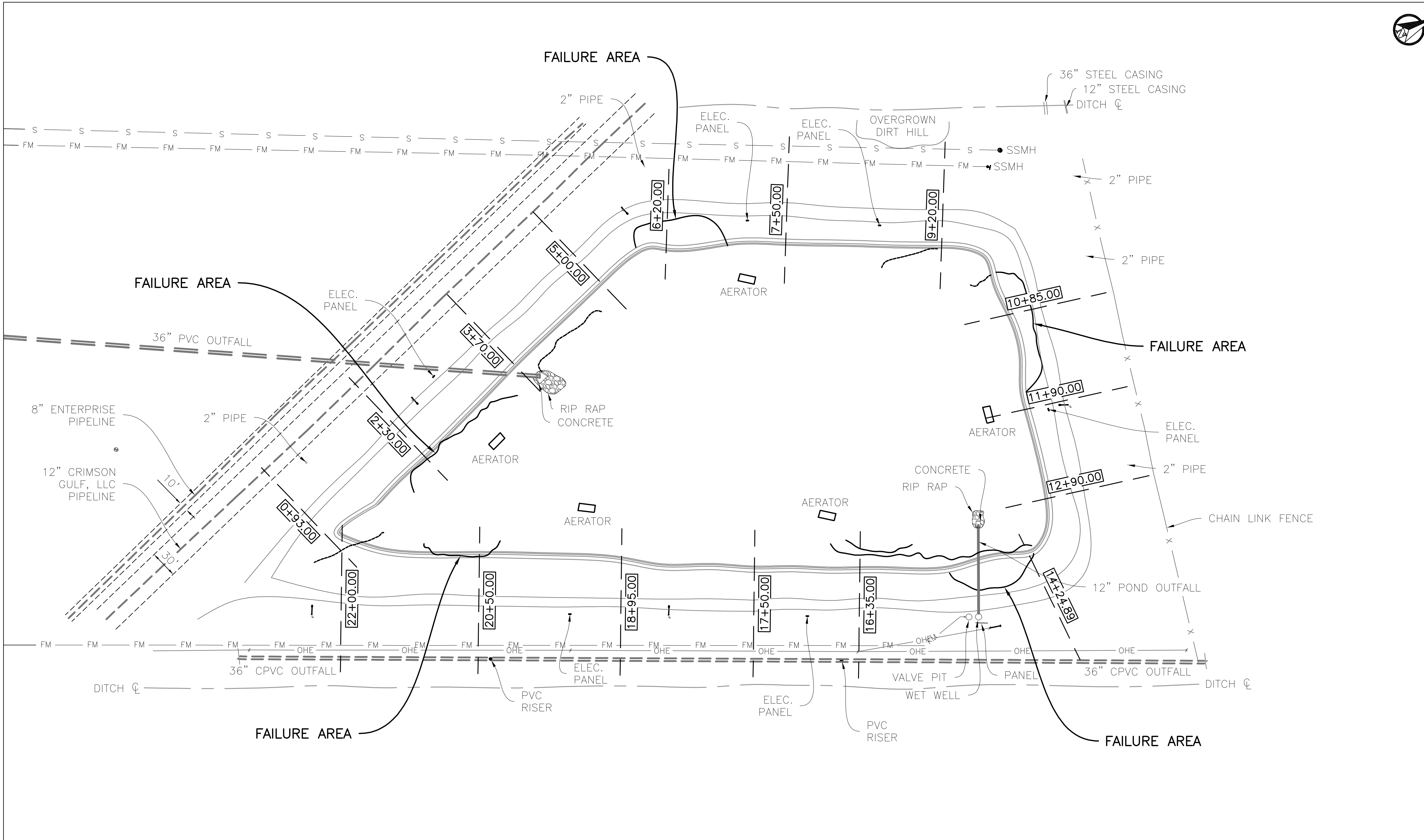


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Scale in Feet

**EXHIBIT A**

Existing Site Plan

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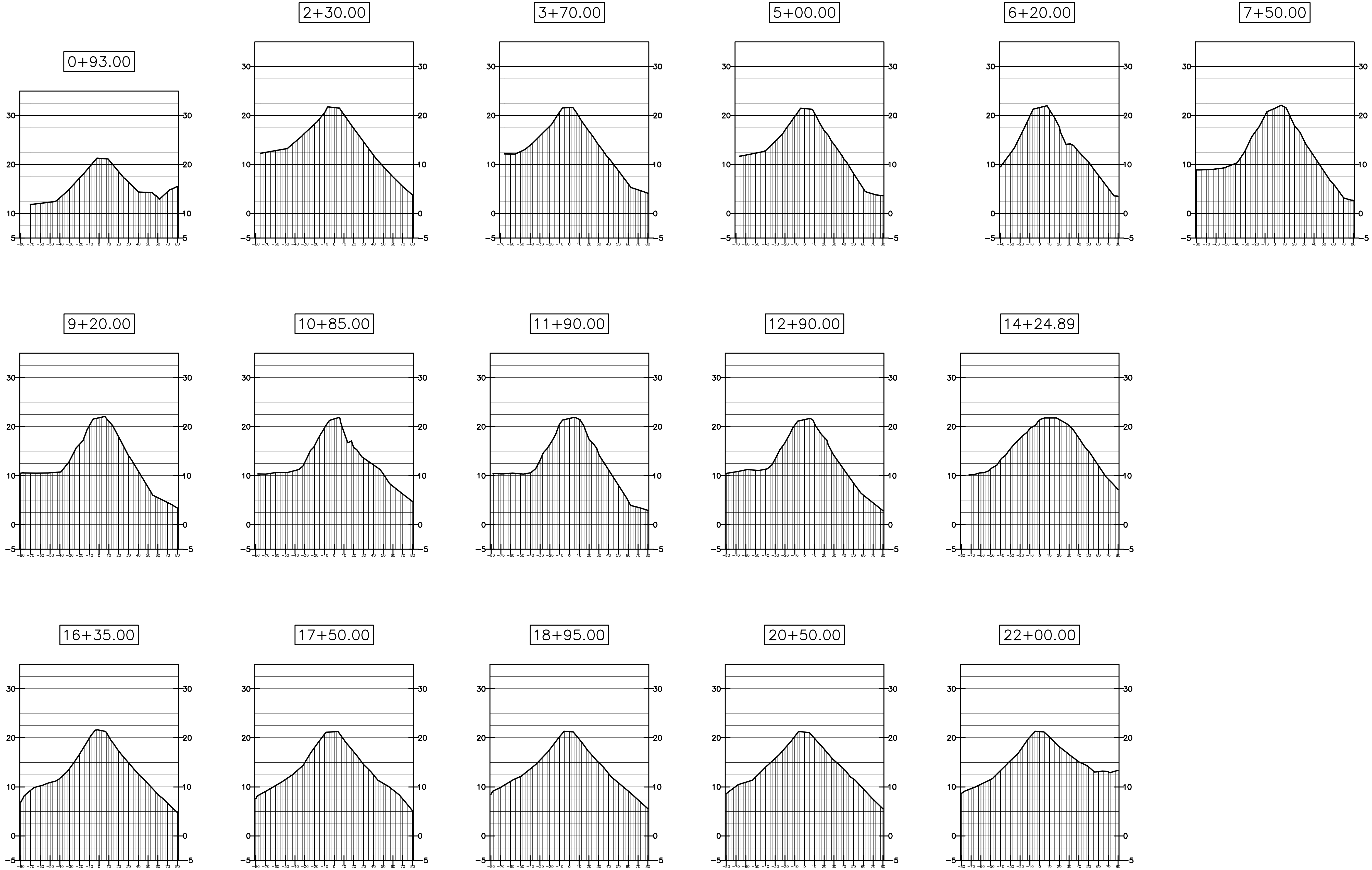


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**EXHIBIT B**

Existing Cross Sections

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Scale in Feet

**EXHIBIT C**
Aerial Photo

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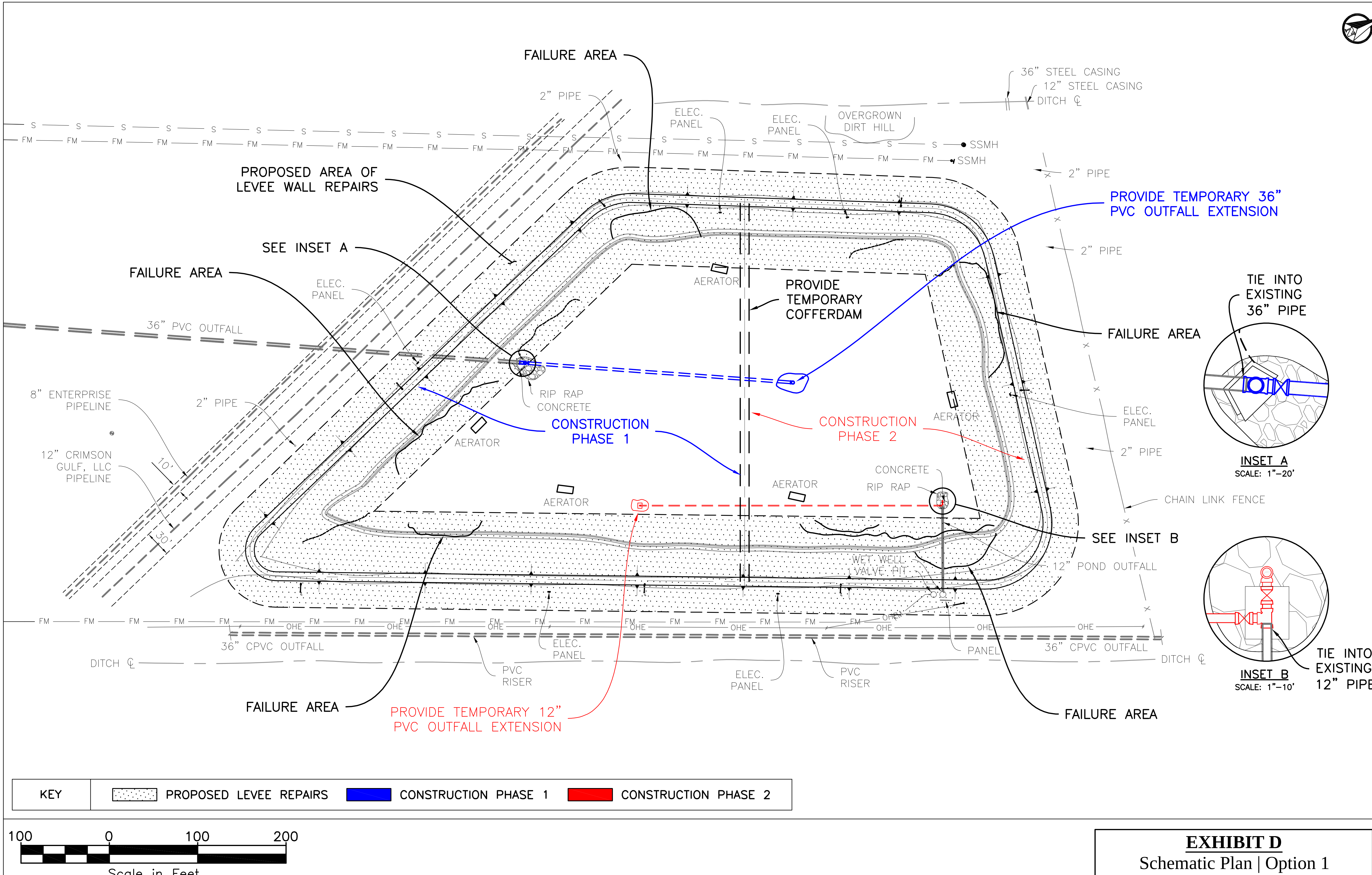


**EXHIBIT D**

Schematic Plan | Option 1

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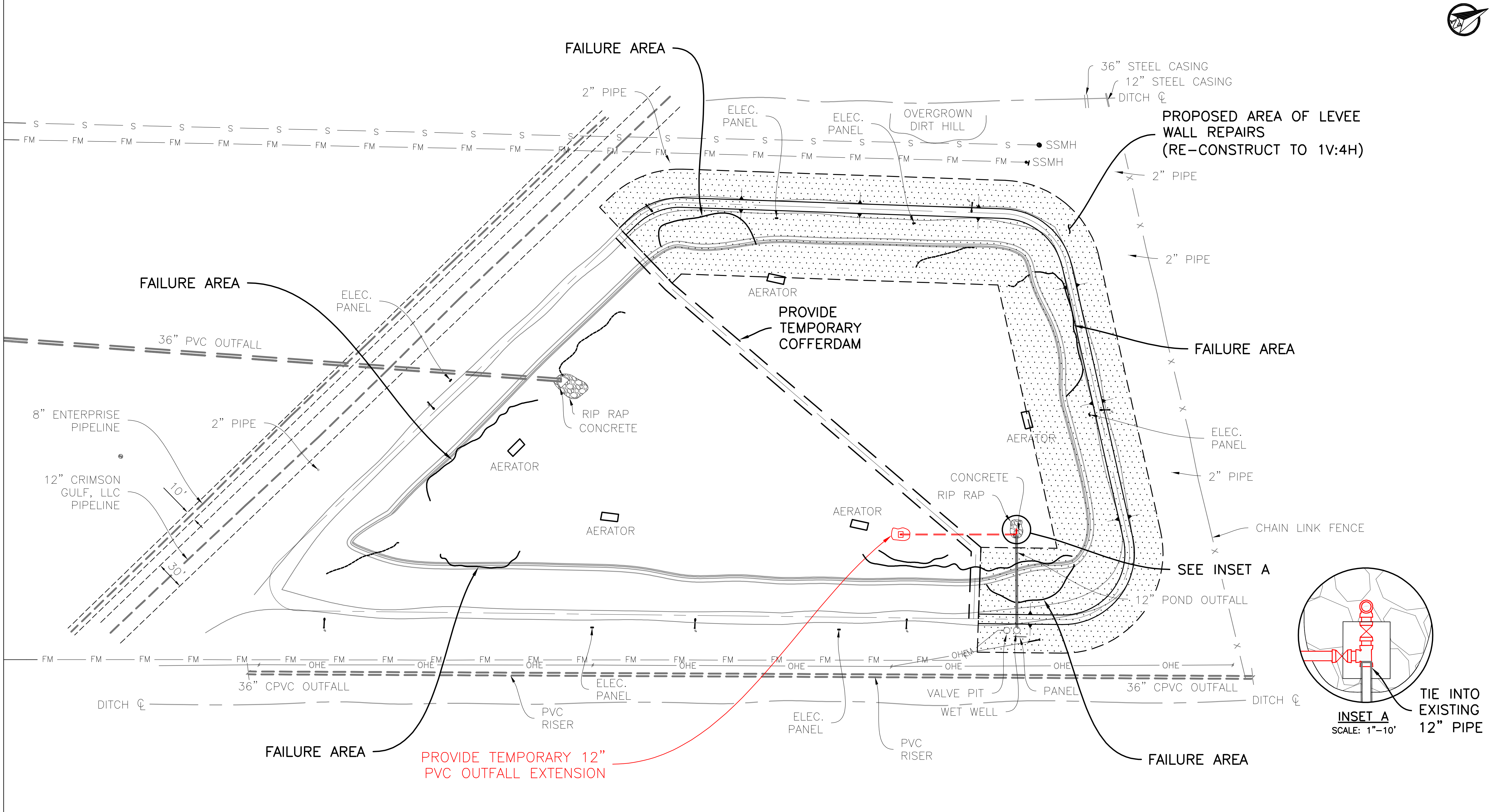


| KEY | PROPOSED LEVEE REPAIRS |
|---|---|

100 0 100 200

Scale in Feet

**EXHIBIT E**

Schematic Plan | Option 2

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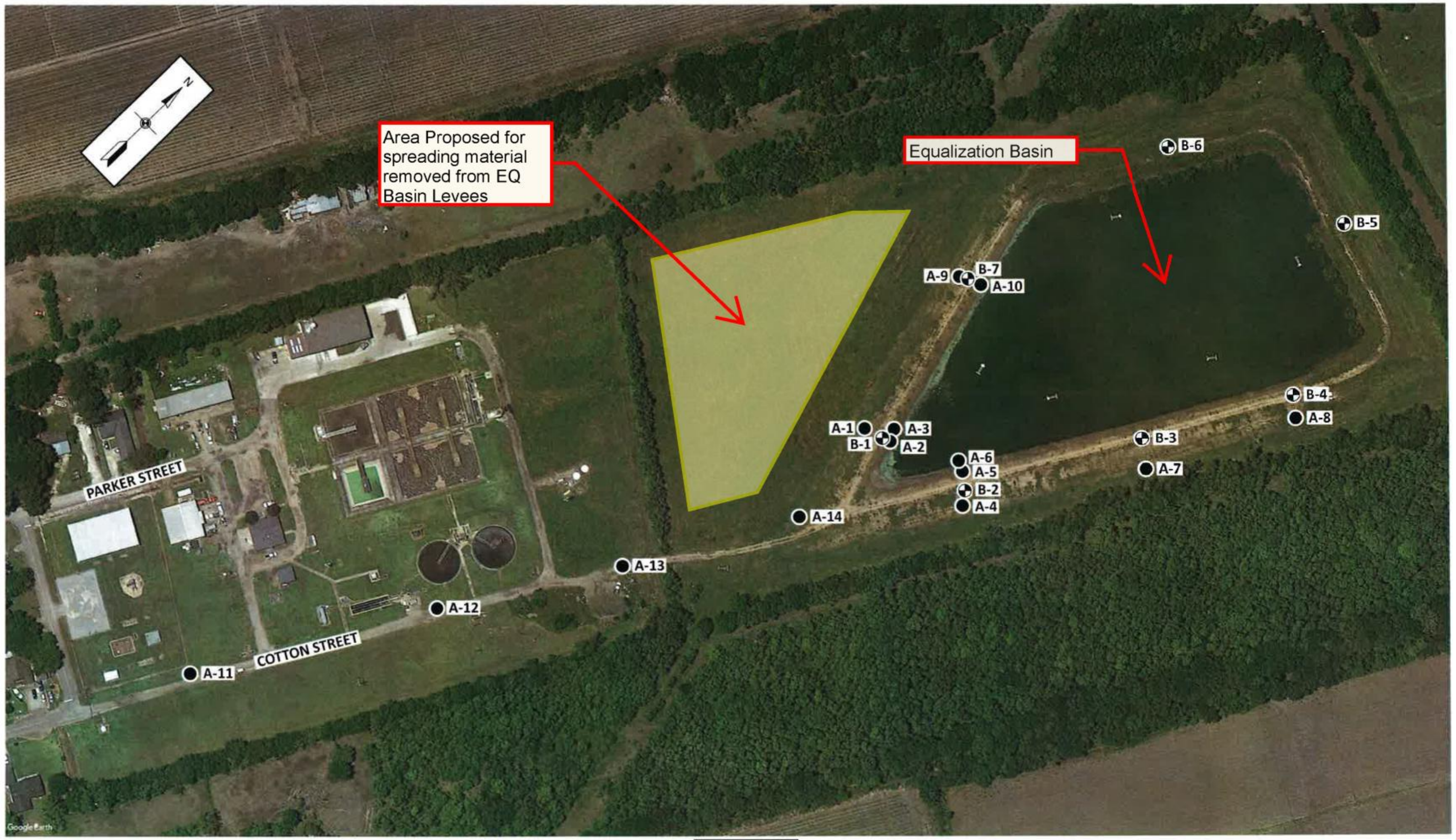


NOT TO SCALE

- ◐ DENOTES LOCATIONS OF UNDISTURBED SOIL BORINGS DRILLED BETWEEN 12 AND 14 DECEMBER 2016
- ● DENOTES LOCATIONS OF AUGER BORINGS DRILLED BETWEEN 16 THROUGH 20 DECEMBER 2016

BORING LOCATION PLAN

CITY OF NEW IBERIA
TETE BAYOU WASTEWATER TREATMENT PLANT
EQUALIZATION BASIN LEVEE REPAIRS
IBERIA PARISH, LOUISIANA

| EUSTIS | DRAWN BY: J.L.S. | JOB NO.: L0474 |
|---|---|---|
| | CHECKED BY: A.J.B. | DATE: 16 MARCH 2017 |
| | CADD FILE: LOCATION PLAN.DGN | FIGURE 1 |

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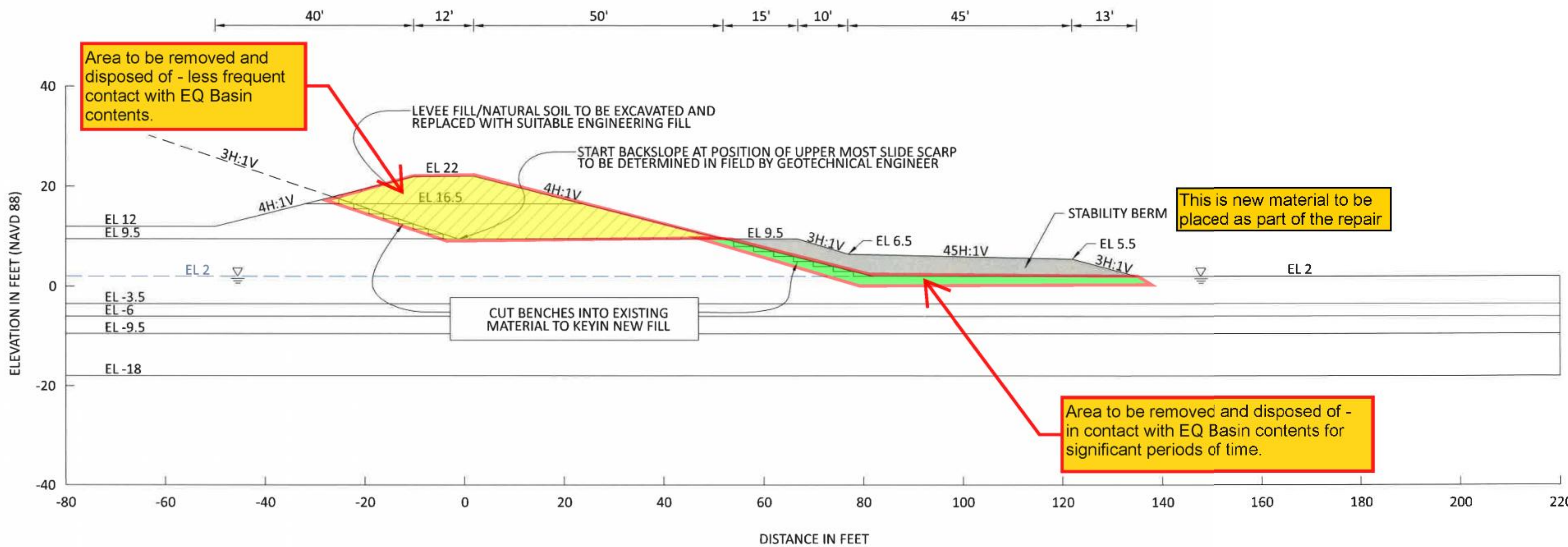
*EXCERPTED AND ANNOTATED FROM GEOTECHNICAL ENGINEERING REPORT BY EUSTIS ENGINEERING, LLC*

**EXHIBIT F**
Aerial Photo Showing Spoil Area




**SEQUENCING:**

1. DEWATER POND AND PREPARE SUBGRADE.
2. CONSTRUCT BERM IN LIFTS TO KEYING-IN EACH LIFT TO THE EXISTING CONTAINMENT SLOPE WITH MINIMUM 4-FT WIDE 1-FT DEEP BENCHES.
3. EXCAVATE FAILED SECTION OF LEVEE AS INDICATED ON FIGURE.
4. RECONSTRUCT LEVEE IN LIFTS BY KEYING-IN EACH LIFT TO THE EXCAVATED BACK SLOPE WITH MINIMUM 3-FT WIDE 1-FT DEEP BENCHES.

CONCEPTUAL REPAIR SEQUENCING
EXISTING LEVEE - SLOPE FAILURE CONDITION

CITY OF NEW IBERIA
TETE BAYOU WASTEWATER TREATMENT PLANT
EQUALIZATION BASIN LEVEE REPAIRS
IBERIA PARISH, LOUISIANA

EUSTIS ENGINEERING LLC

| | |
|---|---|
| DRAWN BY: J.L.S. | JOB NO.: L0474 |
| CHECKED BY: G.R.A. | DATE: 17 AUG 2017 |
| CADD FILE: CRS.DGN | FIGURE 5 |



*EXCERPTED AND ANNOTATED FROM GEOTECHNICAL ENGINEERING REPORT BY EUSTIS ENGINEERING, LLC*

**EXHIBIT G**
Typical Levee Repair Section

## Exhibit H - Comparison of Options

| Item | Criteria | Option 1<br>Complete Reconstruction of Levees | Option 2<br>Partial reconstruction/repair of Levees |
|---|---|---|---|
| 1 | Effectiveness | Excellent, higher factor of safety | Moderate, more potential for breaches |
| 2 | Reliability | Most reliable for long term | Lower reliability, continued repairs |
| 3 | Initial Capital Costs | $9,395,000 | $4,841,000 |
| 4 | Annual O&M Costs | $46,000 | $206,000 |
| 5 | Life Cycle Costs | $12,738,121 | $14,957,150 |
| 6 | Right-of-way Availability/Cost/Acquisition Issues | Need to get agreement from gas company; likely only one utility owner; low probability of need for expropriation | Need to get agreement from gas company; likely only one utility owner; low probability of need for expropriation |
| 7 | Scheduling - Time Required to Implement Proposed Improvements | 1 to 2 years inclusive of planning, utility permission, permitting and construction | <1 year inclusive of planning, utility permission, permitting and construction |
| 10 | Traffic Disruption Issues | Minor traffic disruption on Old Jeanerette Hwy. (Hwy. 87) during construction. More hauling with heavy trucks = more damage to plant drives | Minor traffic disruption on Old Jeanerette Hwy. (Hwy. 87) during construction. Less hauling with heavy trucks = somewhat less damage to plant drives |
| 12 | Noise Issues | Noise issues only during construction, but longer construction time. No close neighbors | Noise issues only during construction, shorter construction time initially, but recurrent over years |
| 13 | Safety Issues | Less likelihood of Levee breach, environmental contamination of Tete Bayou and adverse affects on nearby properties. | Higher likelihood of Levee breach, environmental contamination of Tete Bayou and adverse affects on nearby properties. |
| 16 | Permitting considerations | COE, LDWF, and other simple permits likely | Less permitting than Option 1 likely due to less area affected and less significant impact |
| a. | LA DEQ/US EPA | Likely | Likely |
| b. | State Fire Marshal | None | None |
| c. | Coastal Zone Management Agency (LA DNR) | Unlikely | Unlikely |
| d. | Local Government Permits | Minor requirements | Minor requirements |
| e. | Rights-of-way (LA DOTD , Utility servitudes) | Some interaction with LA DOTD possible, some letter of no objection or other coordination with gas company | Some interaction with LA DOTD possible, some letter of no objection or other coordination with gas company |
| f. | US Army Corps of Engineers (wetlands) | Possible | Possible |
| g. | LA Dept. of Wildlife and Fisheries | Likely, but not difficult | Likely, but not difficult |

Note: The criteria listed are not all of equal importance - (the items are not arranged in any particular order of priority or importance).
1 - **"Poor"** does not indicate that the improvements are not necessary or not beneficial. In this chart it means that this option alone will not produce the desired improvements in Levee Stability

Red text = poor or undesirable
Green text = good or desirable
orange text = neutral or moderate affect

# X. APPENDIX – Geotechnical Engineering Report

21 August 2017

City of New Iberia
Wastewater Department
800 Sucrose Drive
New Iberia, Louisiana 70560

Attention Mr. Vincent S. Palumbo, II, P.E.

Ladies and Gentlemen:

Geotechnical Exploration
City of New Iberia
Tete Bayou Wastewater Treatment Plant
Equalization Basin Levee Repairs
Iberia Parish, Louisiana
Eustis Engineering Project No. L0474

Transmitted is an electronic copy of our engineering report covering a geotechnical exploration for the subject project. Hard copies will be provided upon request.

Thank you for asking us to perform these services.

Yours very truly,

EUSTIS ENGINEERING L.L.C.

STATE OF LOUISIANA
SHAUN R. SIMON
License No. 31557
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

SHAUN R. SIMON, P.E.

SRS:brp/bar

# GEOTECHNICAL EXPLORATION

# CITY OF NEW IBERIA

# TETE BAYOU WASTEWATER TREATMENT PLANT

# EQUALIZATION BASIN LEVEE REPAIRS

# IBERIA PARISH, LOUISIANA

# EUSTIS ENGINEERING PROJECT NO. L0474

FOR
CITY OF NEW IBERIA
WASTEWATER DEPARTMENT
NEW IBERIA, LOUISIANA

By
Eustis Engineering L.L.C.
Scott, Louisiana

21 AUGUST 2017

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GEOTECHNICAL EXPLORATION

CITY OF NEW IBERIA

TETE BAYOU WASTEWATER TREATMENT PLANT

EQUALIZATION BASIN LEVEE REPAIRS

IBERIA PARISH, LOUISIANA

EUSTIS ENGINEERING PROJECT NO. L0474

## INTRODUCTION

1. This report contains the results of a geotechnical exploration performed for the equalization basin levee repairs located at the Tete Bayou wastewater treatment plant in Iberia Parish, Louisiana. The exploration was performed in general accordance with Eustis Engineering L.L.C.'s proposal dated 1 November 2016, which was accepted on 2 November 2016 by Mr. Vincent S. Palumbo, II, P.E., representing the City of New Iberia, the owner of the project. Domingue, Szabo & Associates, Inc., Lafayette, Louisiana, is the civil engineer for the project.

## SCOPE

2. The scope of the exploration included the drilling of seven undisturbed sample type soil test borings and 14 auger borings to determine subsoil conditions and stratification, and to obtain samples of the various strata encountered. Soil mechanics laboratory tests, performed on samples obtained from the borings, were used to evaluate the physical properties of the various substrata. Based on the soil borings and laboratory tests, analyses were made to evaluate stability of existing levee slopes and develop a solution to minimize future levee failures. Recommendations were also provided regarding aggregate

surface pavement components to rehabilitate the access driveway. In addition, general construction recommendations have been provided regarding site preparation, drainage, and placement and compaction of levee fill materials.

## SOIL BORINGS

### General

3. Seven undisturbed soil test borings and 14 auger borings were taken at the project site between 12 and 20 December 2016. The undisturbed borings, designated as Borings B-1 through B-7, were made through the existing equalization pond levee crown to depths of 50 feet. Within the levee side slopes, ten auger borings, designated as Borings A-1 through A-10, were drilled to depths of 10 feet below the existing ground surface. Along the access driveway, four shallow auger borings were drilled to 8-ft depths for evaluation of the proposed pavements. The approximate locations of the borings are shown on Figure 1.

4. The borings were drilled using a track mounted rotary type drill rig or hand auger equipment. Detailed descriptive logs of the borings made for this exploration are shown in both tabular and graphical form in Appendix I. GPS coordinates (latitude and longitude) for the as-drilled boring locations were obtained using a handheld unit and therefore should be considered as approximate. These are shown on the boring logs in Appendix I. Upon completion of the field operations, the borings were backfilled with a cement-grout mix in accordance with current regulatory requirements by the state of Louisiana.

Undisturbed Borings

5. Samples of cohesive or semi-cohesive subsoils were obtained at close intervals or changes in stratum using a 3-in. diameter thinwall Shelby tube sampling barrel. The samples were immediately extruded from the sampling barrel, inspected, and visually classified by Eustis Engineering's soil technician. Pocket penetrometer tests were performed on the soil samples to give a general indication of their shear strength or consistency. The results of these tests are shown on the boring logs in Appendix I under the column heading "PP." Representative portions were then promptly placed in moisture proof containers and were sealed for preservation of their natural moisture content.

Auger Borings

6. In the auger borings, the subgrade soils were sampled directly from the auger blades at close intervals or changes in strata. These samples were sealed in plastic bags to preserve their natural moisture content. Results of these tests are included on logs of the auger borings in Appendix I.

## LABORATORY TESTS

7. Soil mechanics laboratory tests, consisting of natural water content, unit weight, and either unconfined compression shear (UC) or one-point unconsolidated undrained triaxial compression shear (OB), were performed on samples obtained from the undisturbed borings. In addition, Atterberg liquid and plastic limits tests were performed on selected representative samples to aid in classification and to give an indication of their relative compressibility. The results of the laboratory tests are summarized on the boring logs in Appendix I.

8. Grain size analyses were also performed on selected samples of cohesionless soils obtained from the borings to determine their particle distribution (PD) curves. The results of these tests are shown on separate sheets following the boring logs in Appendix I.

## DESCRIPTION OF SUBSURFACE CONDITIONS

### Site Reconnaissance

9. Prior to the field operations, a representative of Eustis Engineering visited the site to observe existing conditions. During the site visit, several significant pond side slope failures were seen within the northern and eastern side slopes of the equalization basin. Smaller failures were observed on the southern and eastern slopes near the water's edge. Portions of the pond side slopes were heavily covered with vegetation and small trees were established on the northern and western flood side slopes.

### Stratigraphy

10. Reference to the logs of the undisturbed borings (Borings B-1 through B-7) and auger borings (Borings A-1 through A-10) taken within the equalization basin area indicates the levee fill materials generally comprise soft to hard brown, light brown, red, tan, gray, dark gray, light gray, and greenish-gray silty clay and clay to the natural ground surface between the approximate 10 and 12-ft depths. These levee fill materials are underlain by medium stiff to very stiff light gray, greenish-gray, light brown, gray, and tan clay to the approximate depths of 25 to 30 feet. These clays were underlain by soft to stiff gray, light gray, greenish-gray, and tan clay, silty clay, and sandy clay to the termination depths of the auger borings and undisturbed borings at the 10-ft and 50-ft depths, respectively. In

Borings B-1 and B-4, this lower cohesive stratum was interspersed by medium compact gray clayey silt deposits between depths of 25 and 33 feet.

11. Reference to the auger boring logs taken along the access driveway (Borings A-11 through A-14) indicates the near surface soils generally comprise soft to medium stiff gray, dark gray, and tan clay and silty clay extending to termination at depths of 8 feet below the existing ground surface.

### Ground Water

12. To determine ground water conditions at the time of the field exploration, Boring A-14 was drilled to a depth of 12 feet without the addition of water. Upon completion of the drilling operations, the hole was observed to be dry. After an observation period of approximately 24 hours, the ground water was observed at the 3.5-ft depth. The depth to ground water will vary with climatic conditions; drainage improvements; water levels in the equalization basin pond, ditches, and Tete Bayou; and other factors. The depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

## FOUNDATION ANALYSIS

### Furnished Information

13. We understand the equalization basin levees at the City of New Iberia's Tete Bayou wastewater treatment plant have had multiple failures and repairs since its construction in 2005. The latest repair flattened the slopes from 1 vertical on 3 horizontal (1V:3H) to 1V:4H. Presently, there are areas on the basin side levees that have failed. Some of these

are large failures extending from near the crown to beyond the toe of the slopes on the northern and eastern levees. Smaller failures near the water's edge are evident on the southern and eastern levees. A review of historical aerial photography since construction indicates these larger failures appear to be initiated by smaller failures near the toe that then progress upslope and eventually involve the crest of the levee. We also understand the basin fills quickly during a rainfall event and then may be drained to near empty within a week. Eustis Engineering was asked to evaluate the existing levees for probable failure mechanisms, to determine the likelihood of additional failures for the existing conditions, and to determine a design repair section. Domingue, Szabo & Associates has provided Eustis Engineering with topographic and hydrographic survey data. This data was obtained in 2017 and is included in Appendix II of this report.

## Slope Stability

14. Methodology. Forensic slope stability analyses were conducted by a two-dimensional limit equilibrium stability analysis of selected trial failure surfaces. These analyses were performed using GEO-SLOPE International, Ltd.'s program SLOPE/W 2016, Version 8.16.1.13452. This program utilizes circular and non-circular surfaces to define the soil failure planes. These surfaces are then divided into slices and the factor of safety is computed by summing forces, summing moments, or both. For these analyses, the interslice forces are typically considered. The factors of safety presented with this report are based on Spencer's Method of Slices. Using this method, the recommended minimum factor of safety is 1.4 for long term, drained (S-Case) analyses. Considering the survey data furnished by Domingue, Szabo & Associates, a cross-section near Boring B-1 was selected as a model case.

15. In cases where negative effective stresses were encountered in slices near the ground surface of the slip surface, we inserted a tension crack ($z_t$) to model the inability of the soil mass to transmit tensile stresses. We also allowed the crack to be filled with water. The depth at which the tension crack is applied is typically dependent of the developed undrained shear strength, total unit weight, and angle of internal friction. The maximum tension crack depth required to eliminate negative stresses within the individual slip surface slices in our analyses was applied at the 6.5-ft depth below existing ground surface.

16. Observations. Eustis Engineering has reviewed the previous geotechnical data developed by Louisiana Testing & Inspection, Inc., and Site Engineering, Inc., and the previous construction plans and specifications. We have also reviewed the results of testing performed during construction of the last repair. The geotechnical data obtained for this exploration was evaluated and the current survey data was reviewed. In addition to these data, we have viewed historical aerial imagery at the site via Google Earth®. These data indicate the slope failures initiate at the toe near the water's edge. These smaller failures then destabilize a larger portion of the slope resulting in a larger failure that in turn destabilizes an even larger portion of the slope until the instability extends up to the crown. This process is known as a progressive failure. It is our opinion the initial toe failures are a result of the continual saturation of fat clay soils causing them to weaken. Once the first toe failure occurs, the "softened" soils are at the residual shear strength, and with the lower strength lower the factor of safety of the remaining slope. This progressive weakening of the slope is more severe in the presence of very fat clays (liquid limits in excess of 75) that are subject to swelling and shrinkage. Tension cracking resulting from shrinkage after long periods of drought can lead to rapid water infiltration on the upper portion of an already weakened slope. Tension cracks filled with water on the upper portion of the slope lead to additional driving forces. In addition, poor maintenance of the side slopes allowing tree growth provides another path for moisture to seep around tree

roots and into the weakened slope. Heavy tree growth also removes moisture from the soil in periods of dry weather resulting in additional cracking.

17. To model the initial toe failure, the above mentioned cross-section near Boring B-2 was considered. We initially considered a short term, undrained (Q-Case) condition using the shear strengths determined by the soil borings and laboratory testing, and concluded that the resulting failure surfaces and factors of safety did not represent the observed failures. Considering the sudden drawdown conditions created by the pond usage, our next evaluation was a sudden drawdown condition using long term, drained (S-Case) soil parameters. While the shape of the failure arcs were more representative of what has been observed in the field, the factors of safety were not consistent with the experienced failures. To model both apparent failure surface geometries and to arrive at a factor of safety of 1.0 (representative of an unstable slope), we considered the fat clay soils at the toe and the fully softened and residual strengths that would be expected based on their plasticity characteristics and clay content. We performed a back calculation by varying the shear strength in these fat clays until we obtained a failure surface having a factor of safety of 1.0 with the observed geometry in the field. This back calculation indicated the shear strength of these materials is approximately 20% greater than their residual strengths. Non-linear shear strength envelopes were estimated from drained residual and fully softened friction angles based on plasticity characteristics and estimated clay fraction as suggested by Stark and Hussain in "Empirical Correlations; Drained Strength for Slope Stability Analyses," ASCE Journal of Geotechnical and Geoenvironmental Engineering, Volume 139, Issue 6 (2013). The slope stability analyses used to model the progressive failure and back calculate the strengths are presented on Figures 2 and 3.

18. Figure 2 is for the initial toe failure. Figure 3 is for the larger failure that almost reaches the crown with a factor of safety of 1 (failure) and that has the shape closest to our visual observations.

19. It is our opinion these failures will continue to occur based on the current levee geometry, pond usage, maintenance, and soil types present at the levee toe and on the exposed levee slopes. In order to minimize future levee failures, we recommend the levee be reconstructed and a stability berm be added as shown on Figure 4. The levee reconstruction and stability berm construction should also follow the recommendations given below. These recommendations are summarized on Figure 5. Please note, our analyses and recommendations assume the berm side slopes exist at a 1V:4H. Should portions of the berm not have been reconstructed to these slopes, they will need to be reshaped prior to installation of the stability berm. In addition, we recommend the side slopes and crown be properly maintained throughout the life of the basin. This should include mowing of grass and prevention of tree growth. An inspection schedule should be set to monitor slope movement, erosion, and maintenance. The inspections should be conducted by the civil and geotechnical engineers of record.

Levee Reconstruction

20. Dewatering of Pond and Preparation of Subgrade. As a first step in the levee repair process, the pond should be completely dewatered. The subgrade on the pond bottom that will be receiving the stability berm should be stripped of all vegetation and other deleterious materials, scarified to a depth of 6 inches, moisture conditioned to ±2% of the optimum moisture content, and then recompacted to at least 95% of the maximum dry density as determined by ASTM D-698.

21. Stability Berm Fill Material Properties. The select cohesive fill should meet the material requirements of "Selected Soils" in Section 203.06(b) of the Louisiana Standard Specifications for Roads and Bridges (LSSRB), 2006 edition, or be classified as an AASHTO A-4 or A-6 material with the following restrictions. Cohesive structural fill should have a plasticity index (PI) between 10 and 20, maximum liquid limit (LL) of 40, and maximum silt content of 50%. Cohesive fill, from either onsite or offsite borrow areas, should also be evaluated for its shrink/swell potential prior to use for levee fill. All select fill should be free of wood, roots, clay lumps, and other deleterious materials, and have a maximum organic content of 5% by weight.

22. Compaction of Stability Berm. Structural fill for the stability berm should be placed in maximum 9-in. loose lifts and moisture conditioned to ±2% of the optimum moisture content and compacted to at least 95% of the maximum dry density as determined by ASTM D 698. These lifts should be cut into the existing failed section of the containment berm using approximately 3-ft wide and 1-ft high benches on a 1V:4H slope to prevent the formation of a weakened pre-existing slide surface. An illustration of the proposed construction is shown on Figure 5.

23. Excavation of Failed Section Above Stability Berm. Once the stability berm has been constructed, the portion of the levee above the top of the berm (el 9.5) that has been involved in the instabilities should be completely excavated above the top of the berm from the existing pond side slope to beyond the existing slide plane. The actual limits of this excavation can be set by identifying the upper head scarp of each slide extending above el 9.5 and by setting the excavation limits to be at or beyond that point. If multiple head scarps are present, the one furthest upslope should be used for these purposes. Eustis Engineering is available to inspect each of these slides and identify the head scarp.

24. The excavation should proceed with a back slope of 1V:3H into the existing levee. Once the entire unstable portion of each slide has been removed, filling should proceed with structural fill placed in maximum 9-in. lifts and moisture conditioned to ±2% of the optimum moisture content and compacted to at least 95% of the maximum dry density as determined by ASTM D 698. Each lift should be cut into the existing levee backslope using approximately 3-ft wide and 1-ft high benches on a 1V:3H slope to prevent the formation of a weakened pre-existing slide surface. An illustration of the proposed reconstruction is provided on Figure 5.

25. Erosion Control. In general, we recommend the reconstructed side slopes and stability berm be monitored for erosion and consideration be given to establishing vegetative growth across the entire construction area to minimize erosion and the potential of local sloughing. Erosion channels and embankment degradation can also be minimized by the use of erosion matting or various other erosion protection methods. Erosion control should follow the recommendations presented in Section 720 of the LSSRB. Eustis Engineering can provide further recommendations regarding erosion control should they be required.

## Pavement Recommendations

26. Traffic. Traffic volumes were not furnished. Therefore, Eustis Engineering has made assumptions necessary to provide flexible surface pavement recommendations. These traffic assumptions should be verified prior to implementation of our recommendations. If traffic conditions are greater than those presented, Eustis Engineering should be contacted to reevaluate the pavement recommendations contained in this report.

27. Method of Analysis. The pavement components and thicknesses were determined using methods presented in the AASHTO Guide for Design of Pavement Structures. In addition, the resilient soil modulus ($M_r$) of the subgrade was estimated based on the type of soil, probable drainage conditions, and engineering experience. A terminal serviceability index ($P_t$) of 2.0 was used for the analyses of flexible pavements. Assumed loading repetitions were converted to equivalent 18-kip single axle loads ($E_{18}$) using AASHTO equivalency factors for flexible pavements.

28. Aggregate Surface Paving. Aggregate surface pavements are normally designed between a minimum of 10,000 ($E_{18}$) and up to a maximum of 100,000 ($E_{18}$). Equivalent 18-kip single axle loads ($E_{18}$) were estimated for various thicknesses of aggregate pavements. The results of our analyses are shown in the following table.

SUMMARY OF RESULTS FOR AGGREGATE SURFACE PAVEMENT ANALYSES

| EQUIVALENT 18-KIP SINGLE AXLE LOADS ($E_{18}$) | REQUIRED STRUCTURAL NUMBER (SN) | AGGREGATE SURFACE COURSE THICKNESS (IN INCHES) | SAND SUBBASE THICKNESS (IN INCHES) |
|---|---|---|---|
| 10,000 | 1.49 | 6 | 12 |
| 100,000 | 2.20 | 9 | 12 |

29. The recommendations above assume all paving materials will conform to the LSSRB. If the types and thicknesses of pavement components are changed, Eustis Engineering should be consulted to determine the suitability of these materials and the structural number of the pavement.

## Pavement Construction

30. Ground Water Management. The initial step to prepare the site for construction should be to establish adequate temporary and permanent drainage to prevent ponding of water on the subgrade and ensure immediate runoff of rainfall. We recommend the contractor maintain adequate surface drainage away from the pavement areas during construction. This may be accomplished by utilizing existing drainage features, as well as installing ditches and swales, and by setting grades to ensure positive drainage of water away from the pavement area. Sumps and pumps may be required to remove rainfall and ground water from ditches and shallow excavations. Throughout construction, the contractor should exercise caution during inclement weather to ensure subsoil support is not degraded by construction operations.

31. The near surface soils are subject to a reduction in shear strength and excessive settlement if the moisture content of these soils change (naturally or as a result of construction operations). ***We recommend adequate permanent drainage (including adequate surface and subsurface features as required) be provided to collect rainfall away from the pavement areas after completion of construction. Water should not be allowed to collect near the pavement.*** Grades should provide for adequate drainage to prevent saturation and erosion of the sand subbase and surface course materials.

32. Clearing and Stripping. Within the areas of the proposed pavements, the existing ground surface should be stripped to a depth necessary to remove vegetation, stumps, loose topsoil, debris, organic matter, and any other deleterious materials. Stripping should be to the minimum depth necessary to reach firm undisturbed soil. The exact depth of stripping should be determined during construction. The site should not be stripped until construction drainage measures have been provided.

33. Subgrade Preparation. After the clearing and stripping operations, the exposed surface should be scarified to a depth of 6 inches and recompacted. Recompaction should be to 95% of its maximum dry density near optimum moisture content in accordance with ASTM D 698. Any localized depressions or weak areas identified by scarification should be thoroughly cleaned out to the surface of firm undisturbed soil and backfilled with a select cohesive fill material meeting the plasticity and grading requirements for "Stability Berm Fill" previously described, and placed and compacted under the conditions previously recommended for these materials. ***All clearing, scarifying, and compaction operations should be performed only during periods of dry weather.*** Motorized wheeled equipment should not be allowed within the foundation and pavement areas during periods of inclement weather to prevent rutting of the subgrade.

34. Swales. Special care should be taken to demuck any existing swales or ditches which are to be abandoned and backfilled. Muck excavation should comply with Section 203.04 of the LSSRB, 2006 edition. These features may also require relocation to provide adequate drainage for the site. Once demucked to the surface of firm undisturbed soil, these features should be backfilled with stability berm fill material placed and compacted under the conditions previously recommended for these materials.

35. Geotextile Fabric. After the subgrade has been prepared as recommended, a geotextile ground stabilization fabric should be provided for material separation between the prepared subgrade and pavement subbase. The geotextile fabric should meet or exceed material requirements contained in Section 1019 of the LSSRB for Class C geotextiles. Subsequent to clearing and stripping, the fabric should be placed directly on the undisturbed soils in accordance with the manufacturer's construction recommendations.

36. Sand Subbase. A select granular material, such as sand (AASHTO A-3), should be used as subbase and/or backfill beneath pavements. The select fill should be free of clay lumps, roots, wood, debris, and other deleterious materials and have a maximum organic content of 5% by weight. Sand fill (AASHTO A-3) should be non-plastic and have no more than 10% by weight of material passing a U.S. Standard No. 200 mesh sieve. This material will expedite construction and drain freely after inclement weather.

37. We recommend the sand be placed in two lifts and a biaxial geogrid be placed on the surface of each lift. The geogrid should be a Tensar BX1200, or equivalent, as shown in Appendix III. The aggregate surface road will require maintenance in the future to fill ruts. Ruts should be filled with new aggregate rather than regraded. Grading without fill may damage and displace the geogrid.

38. Structural fill (AASHTO A-3) used as subbase or backfill beneath pavements should be compacted to 95% of its maximum dry density in accordance with ASTM D 1557. Clayey sand and cohesive type fill should not be used as subbase beneath the aggregate surface pavements.

39. Crushed Stone. The material for the crushed stone aggregate paving should conform to all requirements (Section 1003.04(a) of the LSSRB). The stone base (or surface) course should be placed and compacted in accordance with Section 401.

40. Quality Control. Prior to transporting structural fill to the site, a sample of the borrow material should be tested to verify its conformance to the specifications. Density tests should be performed on each lift of the compacted crushed stone fill or sand subbase to determine if the contractor has achieved the recommended density. Clearing, filling, and compaction operations should only be accomplished during periods of dry weather.

Wheeled equipment should not be allowed on the subgrade once proofrolling operations are complete and the inspector has accepted the compacted subgrade.

Vibrations

41. Construction activities have the potential to generate vibrations that may affect nearby structures, pavements, and underground utilities. Eustis Engineering recommends vibrations be monitored during subsequent construction activities of concern. This monitoring should evaluate peak particle velocities during construction activities generating vibrations (hauling fill, moving heavy equipment, etc.) at critical structures with a seismograph. The record of peak particle velocities will provide information in assessing potential damage and the need for changes in construction operations.

42. Peak particle velocities of 0.25 in./sec, as measured by the seismograph, are generally regarded as a vibration level uncomfortable to human perception and may densify loose, cohesionless materials. Peak particle velocities in excess of 0.5 in./sec (measured at a structure) may induce damage to sensitive structures or structures in distress. In some areas, peak particle velocities as low as 0.1 in./sec have been established as allowable limits for historic structures. Allowable sustained peak particle velocities should be established in accordance with the site history and in concert with the owner. In any case, if peak particle velocities exceed 0.25 in./sec at a pavement, utility, or structure of concern, the operations generating these vibrations should be terminated and construction practices modified.

## GEOTECHNICAL SERVICES DURING CONSTRUCTION

43. In order to provide continuity among the exploration, design, and construction phases, Eustis Engineering should be retained to review plans and specifications developed for the project. Eustis Engineering can provide additional geotechnical services which may include consultation during design and construction. We can also provide compaction and inplace density determinations on fill materials. We can perform appropriate laboratory tests to determine the gradation and quality of material proposed as structural fill or backfill. Eustis Engineering can also monitor vibrations.

44. Eustis Engineering should be retained to monitor the geotechnical related work performed by the contractor. This permits the geotechnical engineer that prepared the report to be on hand and quickly evaluate unanticipated conditions, conduct additional tests if required, and when necessary, recommend alternative solutions to problems. This is recommended to avoid major construction cost overruns or contractual disputes on the project.

## LIMITATIONS

45. Eustis Engineering has provided engineering services in accordance with generally accepted geotechnical engineering practices in this locality at this time. No warranty or guarantee is expressed or implied.

46. Our report has been prepared in accordance with generally accepted geotechnical engineering practice for the exclusive use of the City of New Iberia and Domingue, Szabo & Associates for specific application to the subject site. In the event of any changes in the nature, design, or location of the proposed project features, the conclusions and

recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are modified and verified through written correspondence. Should these data be used by anyone other than the City of New Iberia and Domingue, Szabo & Associates, the user should contact Eustis Engineering for interpretation of data and to secure any other information which may be pertinent to the project.

47. Recommendations and conclusions contained in this report are to some degree subjective having partial basis in engineering judgment and experience particular to the design engineer. For this reason, this report should not be included in the contract plans and specifications. However, the results of the soil borings and laboratory tests contained in Appendix I of this report may be included in the plans and specifications. The construction contractor will then be obliged to make an independent interpretation of subsoil conditions at the site, and their potential impact on means and methods used to construct the project features in accordance with the plans and specifications.

48. Note, the analyses and recommendations contained in this report are based, in part, on data obtained from the soil borings. The individual logs of the borings are considered representative of subsurface conditions at their respective locations on the dates completed. No warranty is given the boring logs are representative of subsurface conditions at other locations or times. The nature and extent of variations in subsurface conditions, between and away from the boring locations, may not become evident until construction. If such variations then appear, it will be necessary to reevaluate the recommendations contained in this report.

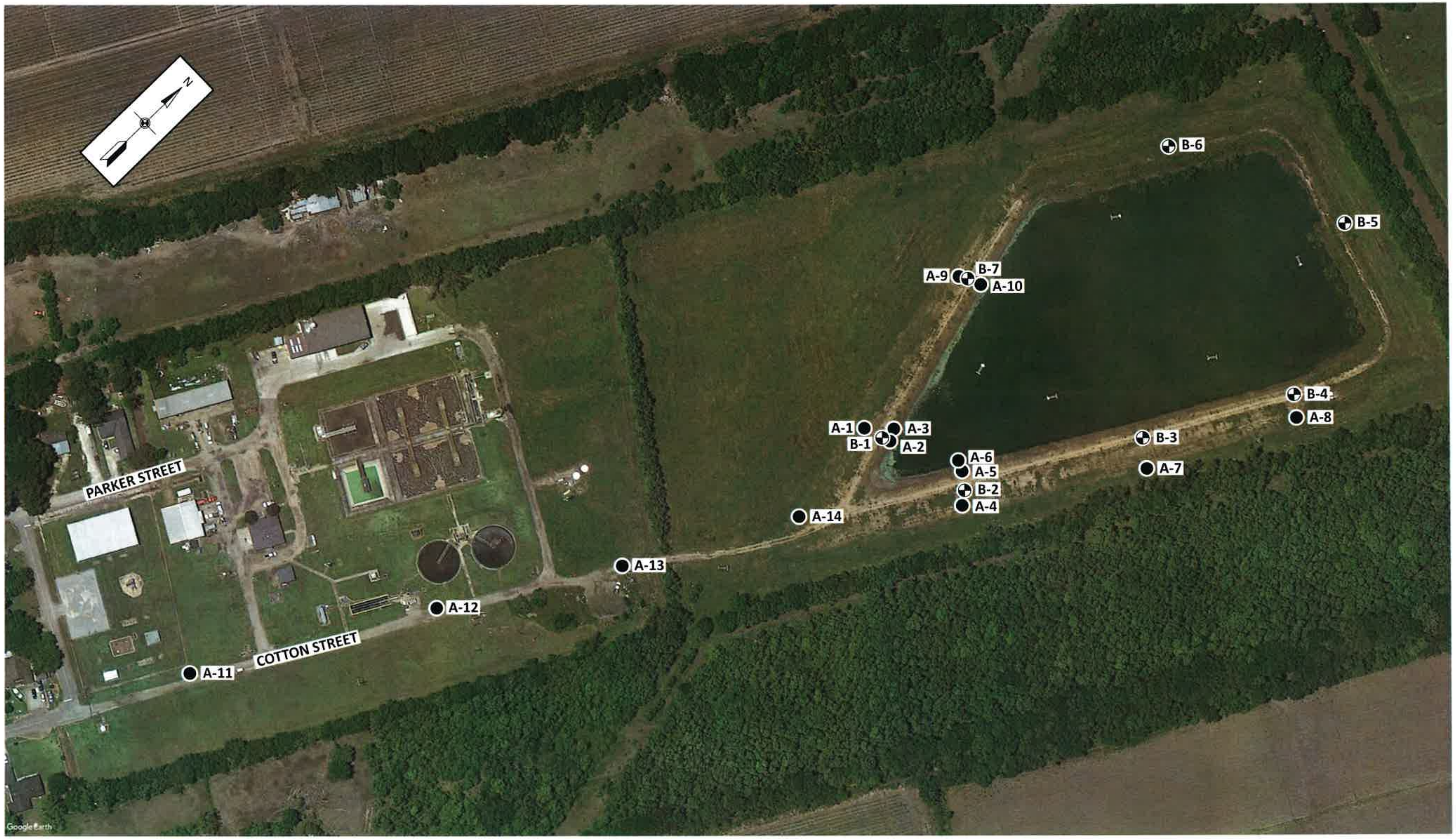
49. Our findings and recommendations in this report are based on selected points of field exploration, laboratory testing, and our understanding of the proposed project.

Furthermore, our findings and recommendations are based on the assumption soil conditions do not vary significantly from those found at the specific exploratory locations. Variations in soil or ground water conditions could exist beyond the exploration points. Variations in soil or ground water may require additional studies, consultation, and possible revisions to our recommendations.

50. This report is issued with the understanding the owner or owner's representative has the responsibility to bring the information and recommendations contained herein to the attention of the engineers for the project so they are incorporated into the plans and specifications for the project. The owner or owner's representative also has the responsibility to take the necessary steps to see the general contractor and all subcontractors follow such recommendations. The owner or owner's representative is responsible for submittal of this report to the appropriate governing agencies.

51. The plans and specifications for the project should be provided to Eustis Engineering for review. This is to ensure the intent of this report is incorporated into the plans and specifications. If Eustis Engineering is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

52. The scope of our service does not include an environmental assessment or an exploration for the presence or absence of wetlands and hazardous or toxic materials in the soil; surface water; ground water; or air on, below, or adjacent to the subject property. Furthermore, the scope does not include the exploration or detection of biological pollutants at the site. The term "biological pollutants" includes but is not limited to molds, fungi, spores, bacteria, viruses, and the byproducts of any such biological organisms.




NOT TO SCALE

DENOTES LOCATIONS OF UNDISTURBED SOIL BORINGS DRILLED BETWEEN 12 AND 14 DECEMBER 2016

DENOTES LOCATIONS OF AUGER BORINGS DRILLED BETWEEN 16 THROUGH 20 DECEMBER 2016

BORING LOCATION PLAN

CITY OF NEW IBERIA
TETE BAYOU WASTEWATER TREATMENT PLANT
EQUALIZATION BASIN LEVEE REPAIRS
IBERIA PARISH, LOUISIANA

EUSTIS ENGINEERING L.L.C.

| | | |
|---|---|---|
| DRAWN BY: J.L.S. | JOB NO.: L0474 |
| CHECKED BY: A.J.B. | DATE: 16 MARCH 2017 |
| CADD FILE: LOCATION PLAN.DGN | FIGURE 1 |

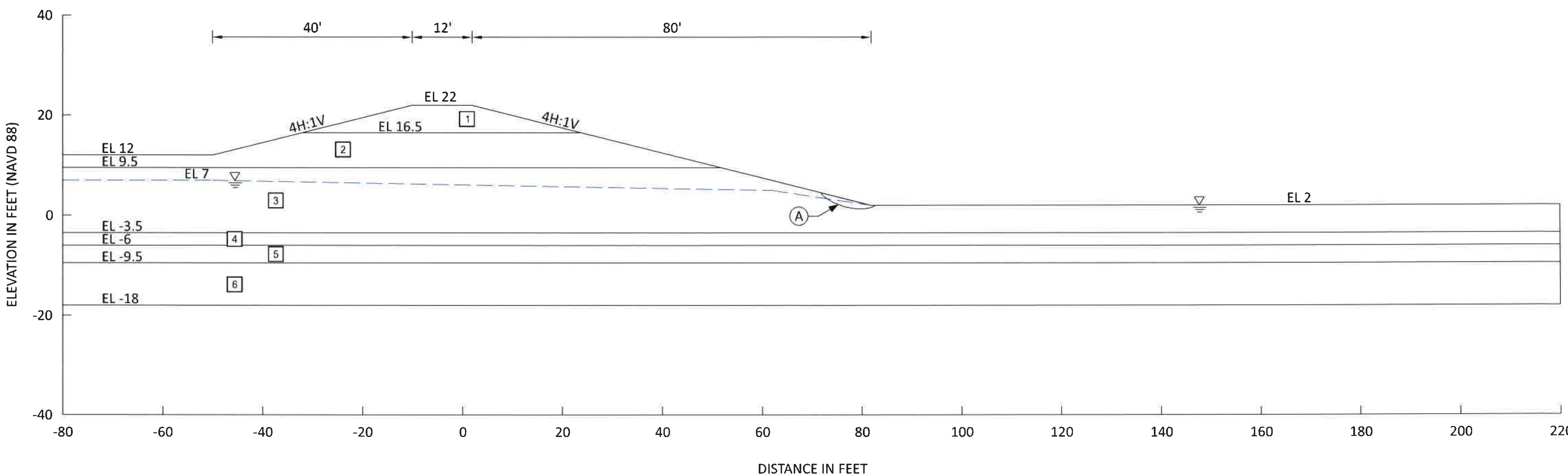



**TABLE 1: DESIGN VALUES**

| SOIL NO. | DESCRIPTION | FRICTION ANGLE IN DEGREES[1] | UNIT WEIGHT IN PCF | COHESION | |
|---|---|---|---|---|---|
| | | | | AVG. | BASE |
| 1 | LEVEE | NL1 | 126 | — | — |
| 2 | CLAY | NL2 | 126 | — | — |
| 3 | CLAY | NL3 | 126 | — | — |
| 4 | CLAY | NL3 | 119 | — | — |
| 5 | CLAY | NL3 | 120 | — | — |
| 6 | CLAY | 23 | 120 | 0 | 0 |

(1) REFER TO TABLE 2 FOR NON-LINEAR (NL) STRENGTH DATA.

**TABLE 2: NON-LINEAR STRENGTH ENVELOPES**

| NORMAL EFFECTIVE STRESS (PSF) | SHEAR STRENGTH (PSF) | | |
|---|---|---|---|
| | NL1 | NL2 | NL3 |
| 0 | 0 | 0 | 0 |
| 1044 | 650 | 485 | 255 |
| 2089 | 1160 | 820 | 450 |
| 8354 | 4090 | 2700 | 1460 |

**TABLE 3: SUMMARY OF RESULTS**

| SLIP DESIGNATION | TYPE OF SEARCH | MINIMUM COMPUTED FACTOR OF SAFETY | MINIMUM REQUIRED FACTOR OF SAFETY | SUBFILE NAME |
|---|---|---|---|---|
| A | BLOCK SPECIFIED | 0.69 | 1.40 | BLOCK |
| SLOPE/W FILE NAME: L0474 - S-CASE GRA CALIBRATED.GSZ | | | | |

**NOTES:**

1. SLOPE STABILITY ANALYSES PERFORMED BY SPENCER'S METHOD OF SLICES USING SLOPE/W SOFTWARE, VERSION 8.16.1.13452.
2. SURVEY DATA DEVELOPED BY PAUL C. PRINCE, LLC.
3. NON-LINEAR STRENGTH DATA WAS ESTIMATED FROM DRAINED RESIDUAL AND FULLY SOFTENED FRICTION ANGLES BASED ON PLASTICITY CHARACTERISTICS AND ESTIMATED CLAY FRACTION AS SUGGESTED BY STARK AND HUSSAIN 2013, "EMPIRICAL CORRELATIONS; DRAINED SHEAR STRENGTH FOR SLOPE STABILITY ANALYSES," ASCE JOURNAL OF GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, VOLUME 139, ISSUE 6.

SLOPE STABILITY ANALYSES
SPENCER'S METHOD, S-CASE
EXISTING LEVEE - TOE FAILURE CONDITION

CITY OF NEW IBERIA
TETE BAYOU WASTEWATER TREATMENT PLANT
EQUALIZATION BASIN LEVEE REPAIRS
IBERIA PARISH, LOUISIANA

EUSTIS ENGINEERING LLC

| | |
|---|---|
| DRAWN BY: J.L.S. | JOB NO.: L0474 |
| CHECKED BY: A.J.B. | DATE: 14 AUG 2017 |
| CADD FILE: S-CASE_TOE.DGN | FIGURE 2 |

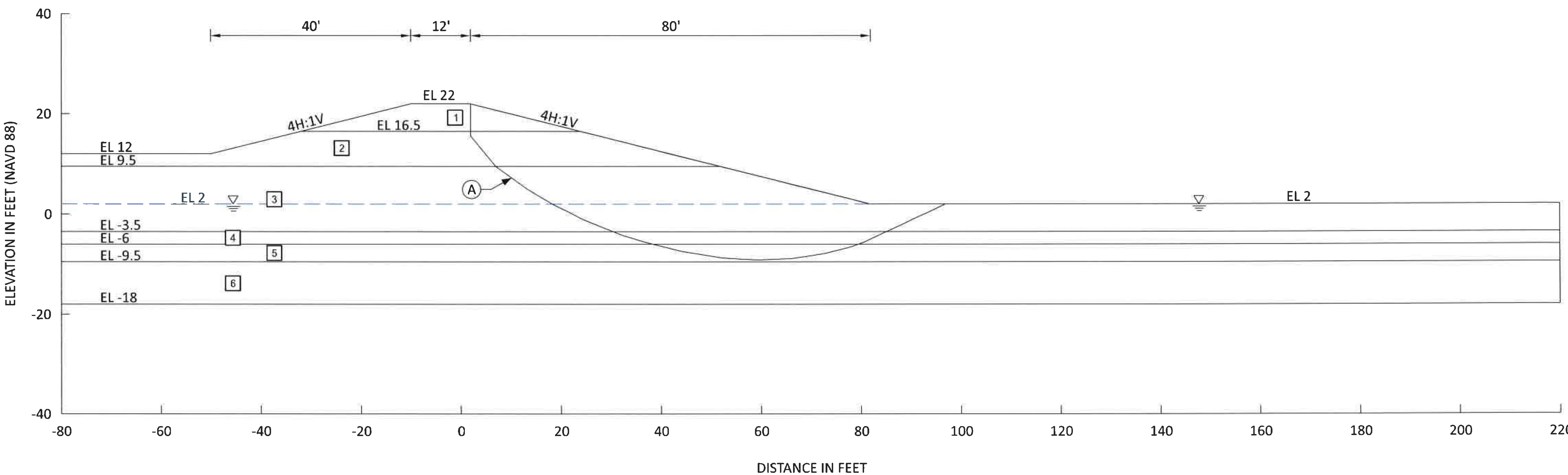



**TABLE 1: DESIGN VALUES**

| SOIL NO. | DESCRIPTION | FRICTION ANGLE IN DEGREES(1) | UNIT WEIGHT IN PCF | COHESION | |
|---|---|---|---|---|---|
| | | | | AVG. | BASE |
| 1 | LEVEE | NL1 | 126 | — | — |
| 2 | CLAY | NL2 | 126 | — | — |
| 3 | CLAY | NL3 | 126 | — | — |
| 4 | CLAY | NL3 | 119 | — | — |
| 5 | CLAY | NL3 | 120 | — | — |
| 6 | CLAY | 23 | 120 | 0 | 0 |

(1) REFER TO TABLE 2 FOR NON-LINEAR (NL) STRENGTH DATA

**TABLE 2: NON-LINEAR STRENGTH ENVELOPES**

| NORMAL EFFECTIVE STRESS (PSF) | SHEAR STRENGTH (PSF) | | |
|---|---|---|---|
| | NL1 | NL2 | NL3 |
| 0 | 0 | 0 | 0 |
| 1044 | 650 | 485 | 255 |
| 2089 | 1160 | 820 | 450 |
| 8354 | 4090 | 2700 | 1460 |

**TABLE 3: SUMMARY OF RESULTS**

| SLIP DESIGNATION | TYPE OF SEARCH | MINIMUM COMPUTED FACTOR OF SAFETY | MINIMUM REQUIRED FACTOR OF SAFETY | SUBFILE NAME |
|---|---|---|---|---|
| A | BLOCK SPECIFIED | 1.01 | 1.40 | BLOCK DRY RES +20% |
| SLOPE/W FILE NAME: L0474 - S-CASE GRA CALIBRATED.GSZ | | | | |

**NOTES:**

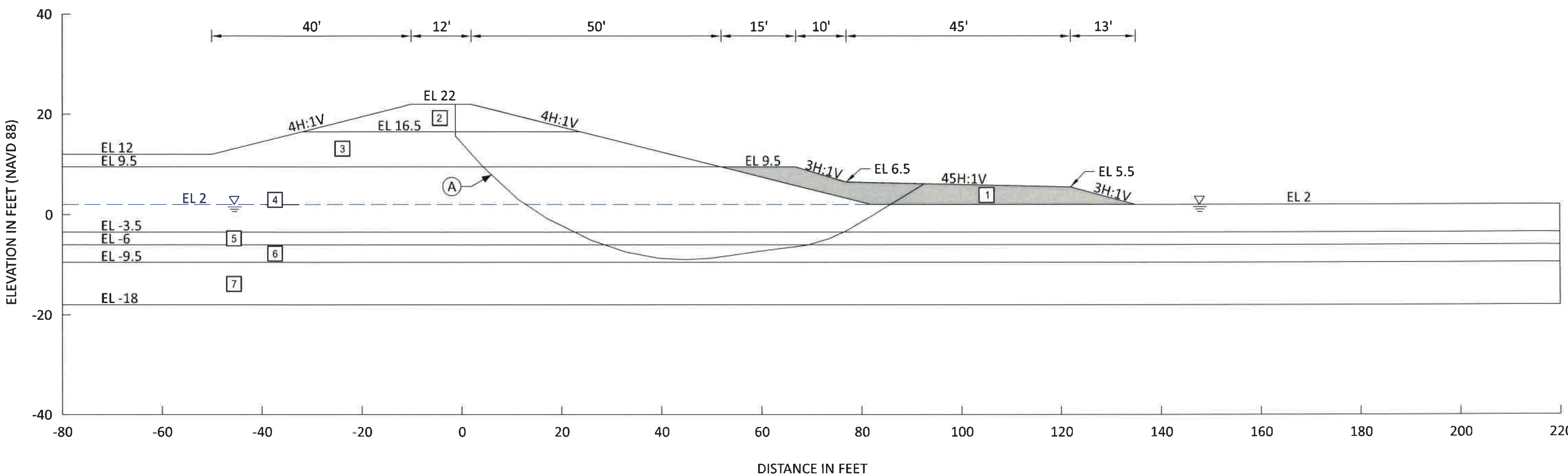
1. SLOPE STABILITY ANALYSES PERFORMED BY SPENCER'S METHOD OF SLICES USING SLOPE/W SOFTWARE, VERSION 8.16.1.13452.
2. SURVEY DATA DEVELOPED BY PAUL C. PRINCE, LLC.
3. NON-LINEAR STRENGTH DATA WAS ESTIMATED FROM DRAINED RESIDUAL AND FULLY SOFTENED FRICTION ANGLES BASED ON PLASTICITY CHARACTERISTICS AND ESTIMATED CLAY FRACTION AS SUGGESTED BY STARK AND HUSSAIN 2013, "EMPIRICAL CORRELATIONS; DRAINED SHEAR STRENGTH FOR SLOPE STABILITY ANALYSES," ASCE JOURNAL OF GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, VOLUME 139, ISSUE 6.

SLOPE STABILITY ANALYSES
SPENCER'S METHOD, S-CASE
EXISTING LEVEE - SLOPE FAILURE CONDITION

CITY OF NEW IBERIA
TETE BAYOU WASTEWATER TREATMENT PLANT
EQUALIZATION BASIN LEVEE REPAIRS
IBERIA PARISH, LOUISIANA

EUSTIS

| | |
|---|---|
| DRAWN BY: J.L.S. | JOB NO.: L0474 |
| CHECKED BY: A.J.B. | DATE: 14 AUG 2017 |
| CADD FILE: S-CASE_LEVEE.DGN | FIGURE 3 |




| TABLE 1: DESIGN VALUES | | | | | |
|---|---|---|---|---|---|
| SOIL NO. | DESCRIPTION | FRICTION ANGLE IN DEGREES[1] | UNIT WEIGHT IN PCF | COHESION | |
| | | | | AVG. | BASE |
| 1 | CLAY | 23 | 120 | 0 | 0 |
| 2 | LEVEE | NL1 | 126 | — | — |
| 3 | CLAY | NL2 | 126 | — | — |
| 4 | CLAY | NL3 | 126 | — | — |
| 5 | CLAY | NL3 | 119 | — | — |
| 6 | CLAY | NL3 | 120 | — | — |
| 7 | CLAY | 23 | 120 | 0 | 0 |

(1) REFER TO TABLE 2 FOR NON-LINEAR (NL) STRENGTH DATA

| TABLE 2: NON-LINEAR STRENGTH ENVELOPES | | | |
|---|---|---|---|
| NORMAL EFFECTIVE STRESS (PSF) | SHEAR STRENGTH (PSF) | | |
| | NL1 | NL2 | NL3 |
| 0 | 0 | 0 | 0 |
| 1044 | 650 | 485 | 255 |
| 2089 | 1160 | 820 | 450 |
| 8354 | 4090 | 2700 | 1460 |

| TABLE 3: SUMMARY OF RESULTS | | | | |
|---|---|---|---|---|
| SLIP DESIGNATION | TYPE OF SEARCH | MINIMUM COMPUTED FACTOR OF SAFETY | MINIMUM REQUIRED FACTOR OF SAFETY | SUBFILE NAME |
| A | ENTRY EXIT | 1.41 | 1.40 | EE A BERM 3 |
| SLOPE/W FILE NAME: L0474 - S-CASE GRA CALIBRATED.GSZ | | | | |

**NOTES:**

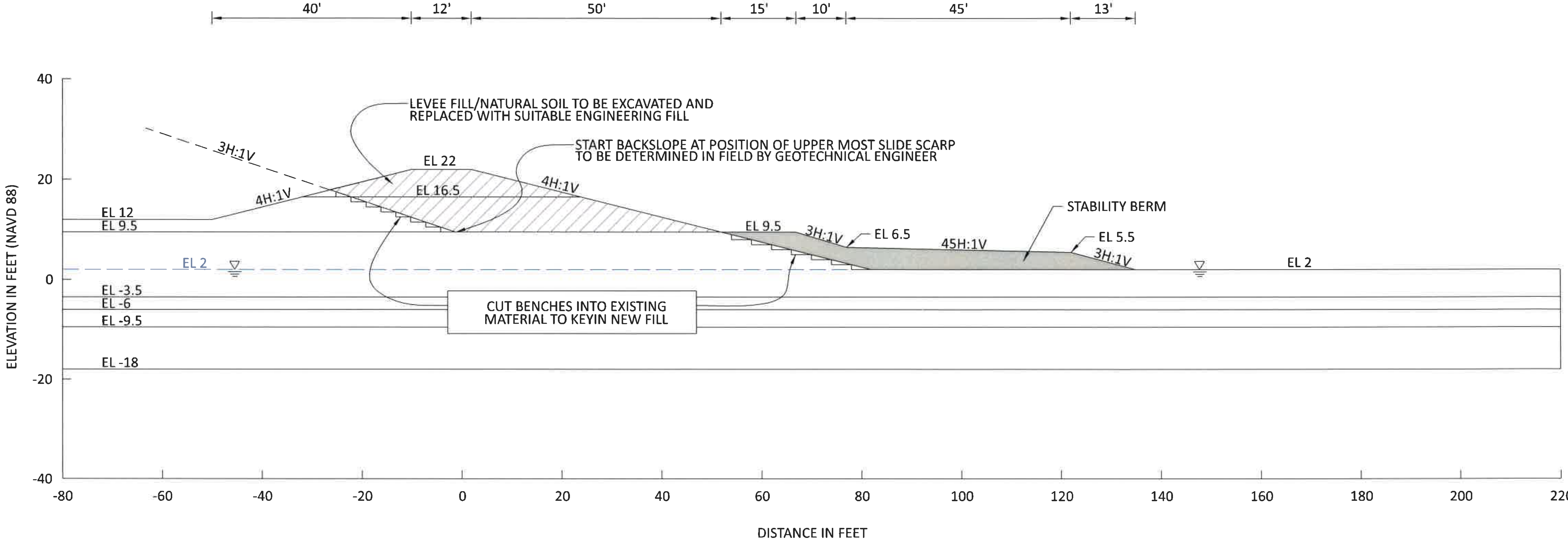
1. SLOPE STABILITY ANALYSES PERFORMED BY SPENCER'S METHOD OF SLICES USING SLOPE/W SOFTWARE, VERSION 8.16.1.13452.
2. SURVEY DATA DEVELOPED BY PAUL C. PRINCE, LLC.
3. NON-LINEAR STRENGTH DATA WAS ESTIMATED FROM DRAINED RESIDUAL AND FULLY SOFTENED FRICTION ANGLES BASED ON PLASTICITY CHARACTERISTICS AND ESTIMATED CLAY FRACTION AS SUGGESTED BY STARK AND HUSSAIN 2013, "EMPIRICAL CORRELATIONS; DRAINED SHEAR STRENGTH FOR SLOPE STABILITY ANALYSES," ASCE JOURNAL OF GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, VOLUME 139, ISSUE 6.

SLOPE STABILITY ANALYSES
SPENCER'S METHOD, S-CASE
EXISTING LEVEE - SLOPE FAILURE CONDITION

CITY OF NEW IBERIA
TETE BAYOU WASTEWATER TREATMENT PLANT
EQUALIZATION BASIN LEVEE REPAIRS
IBERIA PARISH, LOUISIANA

EUSTIS ENGINEERING LLC

| | |
|---|---|
| DRAWN BY: J.L.S. | JOB NO.: L0474 |
| CHECKED BY: A.J.B. | DATE: 14 AUG 2017 |
| CADD FILE: S-CASE_BERM.DGN | FIGURE 4 |




**SEQUENCING:**

1. DEWATER POND AND PREPARE SUBGRADE.
2. CONSTRUCT BERM IN LIFTS TO KEYING-IN EACH LIFT TO THE EXISTING CONTAINMENT SLOPE WITH MINIMUM 4-FT WIDE 1-FT DEEP BENCHES.
3. EXCAVATE FAILED SECTION OF LEVEE AS INDICATED ON FIGURE.
4. RECONSTRUCT LEVEE IN LIFTS BY KEYING-IN EACH LIFT TO THE EXCAVATED BACK SLOPE WITH MINIMUM 3-FT WIDE 1-FT DEEP BENCHES.

CONCEPTUAL REPAIR SEQUENCING
EXISTING LEVEE - SLOPE FAILURE CONDITION

CITY OF NEW IBERIA
TETE BAYOU WASTEWATER TREATMENT PLANT
EQUALIZATION BASIN LEVEE REPAIRS
IBERIA PARISH, LOUISIANA

| | | |
|---|---|---|
| EUSTIS ENGINEERING LLC | DRAWN BY: J.L.S. | JOB NO.: L0474 |
| | CHECKED BY: G.R.A. | DATE: 17 AUG 2017 |
| | CADD FILE: CRS.DGN | FIGURE 5 |

APPENDIX I

EUSTIS
ENGINEERING
SINCE 1946

# LEGEND AND NOTES FOR
# LOG OF BORING AND TEST RESULTS

| | |
|---|---|
| PP | Pocket penetrometer: Resistance in tons per square foot |
| SPT | Standard Penetration Test: Number of blows of a 140-lb hammer dropped 30 inches required to drive 2-in. O.D., 1.4-in. I.D. sampler a distance of 1 foot into the soil after first seating it 6 inches. Values shown have not been corrected. |
| SPLR | Type of Sampling — Shelby, SPT, Auger, Vibracore, Geoprobe, No sample |
| SYMBOL | Clay, Silt, Sand, Peat/Humus, Shells, Stone/Gravel<br>Predominant type shown heavy; modifying type shown light |
| USC | Unified Soil Classification |
| DENSITY | Unit weight in pounds per cubic foot |

SHEAR TESTS

TYPE

- UC Unconfined compression shear
- OB Unconsolidated undrained triaxial compression shear on one specimen confined at the approximate overburden pressure
- UU Unconsolidated undrained triaxial compression shear
- $\phi$ Angle of internal friction in degrees
- c Cohesion in pounds per square foot

ATTERBERG LIMITS

- LL Liquid Limit
- PL Plastic Limit
- PI Plasticity Index

OTHER TESTS

- CON Consolidation
- -#200 Percent passing a U.S. No. 200 sieve
- SV Particle size distribution (sieve only)
- PD Particle size distribution (sieve and hydrometer)
- k Coefficient of permeability in centimeters per second
- SP Swelling pressure in pounds per square foot

Other laboratory test results reported on separate figures

GENERAL NOTES

(1) If a ground water depth is shown on the boring log, these observations were made at the time of drilling and were measured below the existing ground surface. These observations are shown on the boring logs. However, ground water levels may vary due to seasonal fluctuations and other factors. If important to construction, the depth to ground water should be determined by those persons responsible for construction immediately prior to beginning work.

(2) While the individual logs of borings are considered to be representative of subsurface conditions at their respective locations on the dates shown, it is not warranted that they are representative of subsurface conditions at other locations and times.

EUSTIS ENGINEERING SINCE 1946

City of New Iberia
Tete Bayou Wastewater Treatment Plant
Equalization Basin Levee Repairs
Iberia Parish, Louisiana

# LOG OF BORING AND TEST RESULTS

**Boring: B-1**

**Project No:** L0474
**Date:** 12/12/2016
**Latitude:** 29.99322°
**Longitude:** -91.75762°

**Water Depth:** See Text
**Total Depth:** 50.0 ft

| PP | SPT | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | ϕ | C psf | LL | PL | PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Medium stiff brown & tan silty clay w/roots, trace of clay pockets & lenses (fill) | CL | PB-1 | 0 | 21 | | | | | | | | | | |
| 1.00 | | | | 2 | 2 | 24 | 98 | 121 | UC | -- | 814 | 44 | 17 | 27 | | -#200 = 97.9%, PD |
| | | Hard red & tan silty clay w/trace of roots (fill) | CL | | | | | | | | | | | | | |
| 4.00 | | | | 3 | 5 | 22 | 104 | 127 | OB | 0 | 4348 | | | | | |
| | | Hard light brown & tan silty clay w/trace of concretions (fill) | CL | | | | | | | | | | | | | |
| 3.50 | | | | 4 | 8 | 20 | 110 | 131 | UC | -- | 5125 | 39 | 19 | 20 | | -#200 = 98.1%, PD |
| | | Stiff gray & tan clay w/concretions & trace of decayed wood | CH | | | | | | | | | | | | | |
| 2.00 | | | | 5 | 11 | | | | | | | | | | | |
| | | | | 6 | 14 | 44 | 78 | 112 | UC | -- | 1123 | | | | | |
| 1.50 | | | | 7 | 18 | | | | | | | | | | | |
| 1.00 | | w/trace of silt pockets & concretions | | 8 | 23 | 30 | 94 | 122 | UC | -- | 1487 | | | | | |
| | | Medium compact gray clayey silt | ML | | | | | | | | | | | | | |
| 0.50 | | | | 9 | 28 | 27 | 97 | 123 | OB | 0 | 866 | 26 | 23 | 3 | | |
| | | Soft to medium stiff gray sandy clay w/silt pockets | CL | | | | | | | | | | | | | |
| 1.00 | | | | 10 | 33 | 36 | 86 | 116 | UC | -- | 276 | | | | | MINI VANE = 773 PSF |
| 1.00 | | | | 11 | 38 | | | | | | | | | | | |
| 1.50 | | | | 12 | 43 | 37 | 84 | 115 | UC | -- | 457 | | | | | |
| 1.50 | | | | 13 | 48 | | | | | | | | | | | |

Scale in Feet: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

**NOTES:**

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: B-2

**Project No:** L0474
**Date:**
**Latitude:** 29.99335°
**Longitude:** -91.75715°

**Water Depth:** See Text
**Total Depth:** 50.0 ft

| PP | SPT | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Soft brown silty clay (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| 4.50 | | Hard brown silty clay w/silt pockets & roots (fill) | CL | 2 | 2 | 17 | 111 | 129 | UC | -- | 4798 | | | | | |
| 4.50 | | Hard tan & gray silty clay w/silt pockets & trace of concretions (fill) | CL | 3 | 5 | 18 | | | | | | 43 | 22 | 21 | | |
| 1.00 | | Stiff to very stiff gray & dark gray clay w/shell fragments & trace of silt pockets (possible fill) | CH | 4 | 8 | 36 | 85 | 116 | OB | 0 | 1343 | | | | | |
| 4.00 | | | | 5 | 11 | 37 | 86 | 117 | UC | -- | 1747 | | | | | |
| 3.00 | | Medium stiff to very stiff gray & tan clay w/trace of silt pockets & concretions | CH | 6 | 14 | | | | | | | | | | | |
| 3.50 | | | | 7 | 18 | 44 | 77 | 111 | OB | 0 | 752 | 86 | 23 | 63 | | -#200 = 99.6%, PD |
| 2.00 | | | | 8 | 23 | | | | | | | | | | | |
| 1.50 | | Soft to stiff gray & tan clay w/silt pockets | CH | 9 | 28 | 37 | 82 | 112 | UC | -- | 418 | | | | | MINI VANE = 815 PSF |
| 1.50 | | | | 10 | 33 | | | | | | | | | | | |
| | | Medium stiff to stiff gray & tan clay w/silt pockets & concretions | CH | | | | | | | | | | | | | |
| 1.50 | | | | 11 | 38 | 39 | 81 | 112 | OB | 0 | 658 | | | | | |
| | | Medium stiff to stiff gray clay w/silt pockets & trace of concretions | CH | | | | | | | | | | | | | |
| 2.00 | | | | 12 | 43 | | | | | | | | | | | |
| 2.00 | | | | 13 | 48 | 41 | 79 | 112 | UC | -- | 703 | | | | | |

Scale in Feet: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

**NOTES:**

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: B-3

**Project No:** L0474
**Date:** 12/14/2016
**Latitude:**
**Longitude:**

**Water Depth:** See Text
**Total Depth:** 50.0 ft

| PP | SPT | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Soft brown silty clay (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| 4.50 | | Hard tan, light brown, & brown silty clay w/trace of roots (fill) | CL | 2 | 2 | 17 | 110 | 129 | UC | -- | 4507 | | | | | |
| 4.00 | | Very stiff light brown silty clay w/trace of roots & concretions (fill) | CL | 3 | 5 | 18 | 107 | 127 | UC | -- | 3134 | 45 | 20 | 25 | | |
| 2.00 | | Stiff gray & tan clay w/few silt pockets (possible fill) | CH | 4 | 8 | 42 | 79 | 113 | OB | 0 | 1279 | | | | | |
| 2.00 | | | | 5 | 11 | | | | | | | | | | | |
| 1.50 | | Medium stiff to stiff gray clay | CH | 6 | 14 | 50 | 71 | 107 | UC | -- | 770 | | | | | |
| 2.00 | | | | 7 | 18 | | | | | | | | | | | |
| 2.00 | | w/concretions, trace of shell fragments, & organic matter | | 8 | 23 | 46 | 75 | 110 | UC | -- | 796 | | | | | |
| | | Soft gray silty clay | CL-ML | 9 | 28 | 31 | 91 | 120 | OB | 0 | 494 | 28 | 22 | 6 | | -#200 = 97.1% PD |
| 2.00 | | Stiff gray clay w/trace of silt pockets | CH | 10 | 33 | | | | | | | | | | | |
| 2.00 | | | | 11 | 38 | 37 | 83 | 113 | UC | -- | 1023 | | | | | |
| 1.50 | | Medium stiff to stiff gray clay w/few silt pockets | CH | 12 | 43 | | | | | | | | | | | |
| 1.50 | | | | 13 | 48 | 44 | 75 | 108 | UC | -- | 641 | | | | | |

**NOTES:**

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: B-4

**Project No:** L0474
**Date:** 12/14/2016
**Latitude:**
**Longitude:**

**Water Depth:** See Text
**Total Depth:** 50.0 ft

| PP | SPT | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Soft light brown silty clay w/few roots & trace of clay pockets & lenses (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| 4.50 | | Stiff to hard gray & tan silty clay w/trace of silt pockets & concretions (fill) | CL | 2 | 2 | 30 | 91 | 119 | UC | -- | 1462 | | | | | |
| 3.50 | | Very stiff tan & gray silty clay w/roots | CL | 3 | 5 | 20 | | | | | | 37 | 21 | 16 | | -#200 = 99.7% PD |
| 2.50 | | Stiff to very stiff red & tan clay w/trace of concretions (fill) | CH | 4 | 8 | 46 | 76 | 111 | UC | -- | 1046 | | | | | |
| 2.00 | | Medium stiff to stiff greenish-gray & dark gray clay w/trace of silt pockets | CH | 5 | 11 | 41 | 79 | 112 | OB | 0 | 823 | 101 | 31 | 70 | | -#200 = 99.7% PD |
| 2.50 | | | | 6 | 14 | | | | | | | | | | | |
| 2.00 | | Medium stiff to very stiff gray & tan clay w/few silt pockets, trace of concretions, & shell fragments | CH | 7 | 18 | 41 | 81 | 114 | UC | -- | 947 | | | | | |
| 1.50 | | Stiff greenish-gray & tan clay w/few silt pockets & trace of shell fragments | CH | 8 | 23 | 35 | 88 | 118 | UC | -- | 1062 | | | | | |
| 0.50 | | Medium compact gray clayey silt | ML | 9 | 28 | 31 | 92 | 120 | OB | 0 | 503 | | | | | |
| 1.50 | | Medium stiff to stiff gray clay w/trace of silt pockets | CH | 10 | 33 | | | | | | | | | | | |
| 2.00 | | | | 11 | 38 | 44 | 78 | 112 | UC | -- | 542 | | | | | |
| 1.50 | | | | 12 | 43 | | | | | | | | | | | |
| 1.50 | | | | 13 | 48 | 48 | 73 | 109 | OB | 0 | 679 | | | | | |

**NOTES:**

EUSTIS ENGINEERING SINCE 1946

# LOG OF BORING AND TEST RESULTS

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: B-5

**Project No:** L0474
**Date:** 12/14/2016
**Latitude:**
**Longitude:**

**Water Depth:** See Text
**Total Depth:** 50.0 ft

| PP | SPT | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Soft tan & gray silty clay (fill) | CL | PB-1 | 0 | 19 | | | | | | | | | | |
| 2.50 | | Stiff to very stiff gray & tan clay w/trace of concretions & shell fragments (fill) | CH | 2 | 2 | 37 | 86 | 117 | UC | -- | 1381 | 101 | 22 | 79 | | |
| 3.00 | | Very stiff gray & light brown clay w/few silt pockets & trace of concretions(fill) | CH | 3 | 5 | 33 | 90 | 119 | OB | 0 | 2191 | | | | | |
| 2.00 | | Stiff gray & tan clay w/trace of silt lenses (possible fill) | CH | 4 | 8 | 37 | 85 | 116 | UC | -- | 1698 | | | | | |
| 2.50 | | Stiff to very stiff light brown & gray clay | CH | 5 | 11 | 24 | 97 | 121 | OB | 0 | 1335 | 72 | 19 | 53 | | -#200 = 99.8% PD |
| 1.50 | | Medium stiff to stiff gray & tan clay w/few silt pockets | CH | 6 | 14 | | | | | | | | | | | |
| 2.00 | | | | 7 | 18 | 44 | 77 | 111 | UC | -- | 858 | | | | | |
| 1.50 | | | | 8 | 23 | | | | | | | | | | | |
| | | Soft gray silty clay w/trace of clayey silt pockets | CL | 9 | 28 | 30 | 93 | 121 | OB | 0 | 576 | 31 | 18 | 13 | | -#200 = 96.3% PD |
| 0.50 | | Medium stiff gray clay w/trace of organic matter | CH | 10 | 33 | 43 | 79 | 112 | UC | -- | 609 | | | | | |
| 1.00 | | | | 11 | 38 | | | | | | | | | | | |
| 0.50 | | w/trace of silt pockets | | 12 | 43 | 44 | 77 | 111 | UC | -- | 605 | | | | | |
| 1.00 | | | | 13 | 48 | | | | | | | | | | | |

**NOTES:**

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EUSTIS ENGINEERING SINCE 1946

City of New Iberia
Tete Bayou Wastewater Treatment Plant
Equalization Basin Levee Repairs
Iberia Parish, Louisiana

# LOG OF BORING AND TEST RESULTS

## Boring: B-6

**Project No:** L0474
**Date:** 12/13/2016
**Latitude:**
**Longitude:**

**Water Depth:** See Text
**Total Depth:** 50.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Stiff brown & tan clay w/trace of silt pockets & concretions (fill) | CH | PB-1 | 0 | | | | | | | | | | | |
| | 3.00 | | | | | | 2 | 2 | 32 | 87 | 115 | UC | -- | 1189 | | | | | |
| 5 | 4.00 | | | | Stiff to very stiff gray & tan clay w/few concretions, silt pockets, & trace of roots (fill) | CH | 3 | 5 | 32 | 91 | 120 | OB | 0 | 3269 | | | | | |
| | 4.00 | | | | w/concretions & silt pockets | | 4 | 8 | 33 | 86 | 115 | UC | -- | 1688 | 91 | 24 | 67 | | -#200 = 99.8% PD |
| 10 | | | | | | | | | | | | | | | | | | | |
| | 2.00 | | | | Stiff gray & tan clay w/silt pockets & trace of shell fragments | CH | 5 | 11 | 39 | 83 | 115 | OB | 0 | 1646 | | | | | |
| 15 | 2.50 | | | | Very stiff gray clay w/trace of roots, silt pockets, & organic matter | CH | 6 | 14 | 33 | 86 | 115 | UC | -- | 2370 | | | | | |
| | 1.00 | | | | Medium stiff to stiff gray & tan clay w/silt pockets | CH | 7 | 18 | 46 | 75 | 109 | UC | -- | 590 | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| | 1.50 | | | | | | 8 | 23 | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |
| | 0.50 | | | | Medium stiff gray silty clay w/clayey silt lenses | CL | 9 | 28 | 28 | 96 | 123 | OB | 0 | 891 | 31 | 20 | 11 | | -#200 = 91.9% PD |
| 30 | | | | | | | | | | | | | | | | | | | |
| | 1.50 | | | | Medium stiff to stiff gray clay w/silt pockets, trace of organic matter, & roots | CH | 10 | 33 | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | | |
| | 1.50 | | | | | | 11 | 38 | 36 | 86 | 117 | UC | -- | 767 | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | |
| | 0.50 | | | | Soft gray clay w/trace of silt pockets | CH | 12 | 43 | 52 | 70 | 107 | OB | 0 | 446 | | | | | |
| 45 | | | | | | | | | | | | | | | | | | | |
| | 0.50 | | | | | | 13 | 48 | 51 | 72 | 108 | UC | -- | 439 | | | | | |
| 50 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

**Boring: B-7**

**Project No:** L0474
**Date:** 12/13/2016
**Latitude:**
**Longitude:**

**Water Depth:** See Text
**Total Depth:** 50.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Soft brown silty clay w/gravel (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | 4.00 | | | | Hard tan & light brown silty clay w/trace of concretions (fill) | CL | 2 | 2 | 20 | 105 | 125 | UC | -- | 4309 | 46 | 21 | 25 | | -#200 = 99.4% PD |
| 5 | 4.00 | | | | Very stiff light brown & tan silty clay w/trace of concretions (fill) | CL | 3 | 5 | 18 | 104 | 123 | OB | 0 | 3120 | | | | | |
| | 4.50 | | | | Medium stiff to hard brown clay w/silty clay lenses & trace of roots (fill) | CH | 4 | 8 | 33 | 87 | 115 | UC | -- | 977 | | | | | |
| 10 | 3.00 | | | | Stiff to very stiff tan & gray clay | CH | 5 | 11 | 39 | 83 | 115 | OB | 0 | 1718 | | | | | |
| 15 | 1.00 | | | | Medium stiff gray & greenish-gray clay w/concretions & silt pockets | CH | 6 | 14 | 50 | 71 | 106 | UC | -- | 679 | | | | | |
| | 2.00 | | | | Medium stiff to stiff light gray & tan clay w/concretions & silt pockets | CH | 7 | 18 | 46 | 75 | 110 | OB | 0 | 815 | 100 | 26 | 74 | | -#200 = 99.4% PD |
| 20 | 2.00 | | | | Medium stiff to stiff gray & tan clay w/concretions & trace of silt pockets | CH | 8 | 23 | 35 | 86 | 116 | UC | -- | 822 | | | | | |
| 25 | 1.00 | | | | | | 9 | 28 | | | | | | | | | | | |
| 30 | 2.00 | | | | Stiff gray & tan clay w/few silt pockets | CH | 10 | 33 | 35 | 87 | 117 | OB | 0 | 1005 | | | | | |
| 35 | 2.00 | | | | | | 11 | 38 | | | | | | | | | | | |
| 40 | 1.00 | | | | Medium stiff gray clay w/few silt pockets | CH | 12 | 43 | 41 | 80 | 113 | UC | -- | 681 | | | | | |
| 45 | 0.50 | | | | | | 13 | 48 | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: A-1

**Project No:** L0474
**Date:**
**Latitude:** 29.99318°
**Longitude:** -91.75772°

**Elevation:** 17.5
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Medium stiff brown silty clay w/trace of roots (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 17 | | | | | | | | | | |
| | | | | | Soft to medium stiff gray & brown silty clay w/trace of sand, concretions, organic matter, & roots (possible fill) | CL | PB-3 | 3 | 22 | | | | | | 42 | 20 | 22 | | -#200 = 95.7%, PD |
| 5 | | | | | | | PB-4 | 5 | | | | | | | | | | | |
| | | | | | Soft to medium stiff tan & gray silty clay w/trace of concretions | CL | PB-5 | 7 | 25 | | | | | | | | | | |
| | | | | | | | PB-6 | 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

**Boring: A-2**

**Project No:** L0474
**Date:** 12/19/2016
**Latitude:** 29.99323°
**Longitude:** -91.75758°

**Elevation:** 18.0
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Medium stiff tan & gray silty clay w/trace of concretions & roots (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 22 | | | | | | | | | | |
| | | | | | w/sand, trace of concretions, & organic matter | | PB-3 | 3 | 24 | | | | | | 41 | 20 | 21 | | -#200 = 94.8%, PD |
| 5 | | | | | Soft to medium stiff tan silty clay w/trace of concretions & clay pockets (possible fill) | CL | PB-4 | 5 | 26 | | | | | | | | | | |
| | | | | | Medium stiff gray clay w/trace of silt pockets | CH | PB-5 | 7 | | | | | | | | | | | |
| | | | | | | | PB-6 | 9 | 45 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

EUSTIS ENGINEERING SINCE 1946

# LOG OF BORING AND TEST RESULTS

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: A-3

**Project No:** L0474
**Date:**
**Latitude:** 29.99328°
**Longitude:** -91.75762°

**Elevation:** 16.0
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Medium stiff tan & gray silty clay w/trace of roots & concretions (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 21 | | | | | | 42 | 20 | 22 | | |
| | | | | | | | PB-3 | 3 | | | | | | | | | | | |
| 5 | | | | | Medium stiff tan & gray clay w/silt pockets, trace of concretions, sand, organic matter, & roots (fill) | CH | PB-4 | 5 | 32 | | | | | | 55 | 15 | 40 | | -#200 = 95.4%, PD |
| | | | | | Medium stiff gray clay w/trace of silt pockets, concretions, shell fragments, & roots (possible fill) | CH | PB-5 | 7 | | | | | | | | | | | |
| | | | | | | | PB-6 | 9 | 45 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

**NOTES:**

EUSTIS ENGINEERING SINCE 1946

# LOG OF BORING AND TEST RESULTS

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: A-4

**Project No:** L0474
**Date:** 12/19/2016
**Latitude:** 29.99330°
**Longitude:** -91.75710°

**Elevation:** 12.3
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Medium stiff brown & gray silty clay w/trace of concretions, sand, & organic matter (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 23 | | | | | | 40 | 21 | 19 | | -# 200 = 98.4%, PD |
| | | | | | | | PB-3 | 3 | | | | | | | | | | | |
| 5 | | | | | | | PB-4 | 5 | | | | | | | | | | | |
| | | | | | Medium stiff gray clay w/trace of concretions & silt pockets | CH | PB-5 | 7 | 38 | | | | | | 104 | 31 | 73 | | |
| | | | | | | | PB-6 | 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

**Boring: A-5**

**Project No:** L0474
**Date:** 12/19/2016
**Latitude:** 29.99340°
**Longitude:** -91.75723°

**Elevation:** 17.3
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | ϕ | C psf | Atterberg Limits LL | PL | PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Stiff brown & tan silty clay w/trace of roots (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 22 | | | | | | | | | | |
| | | | | | Medium stiff light brown & gray silty clay w/trace of concretions (possible fill) | CL | PB-3 | 3 | 24 | | | | | | 41 | 22 | 19 | | -#200 = 98.4%, PD |
| 5 | | | | | | | PB-4 | 5 | | | | | | | | | | | |
| | | | | | Stiff dark gray clay w/trace of silt pockets & roots | CH | PB-5 | 7 | | | | | | | | | | | |
| | | | | | | | PB-6 | 9 | 44 | | | | | | 100 | 35 | 65 | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

EUSTIS ENGINEERING SINCE 1946

# LOG OF BORING AND TEST RESULTS

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: A-6

**Project No:** L0474
**Date:** 12/16/2017
**Latitude:** 29.99342°
**Longitude:** -91.75728°

**Elevation:** 11.0
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Very stiff brown & light gray silty clay w/trace of sand, organic matter, & concretions (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 17 | | | | | | 37 | 22 | 15 | | -#200 = 99.2%, PD |
| | | | | | Medium stiff gray clay w/trace of silt pockets & roots | CH | | | | | | | | | | | | | |
| | | | | | | | PB-3 | 3 | | | | | | | | | | | |
| 5 | | | | | | | PB-4 | 5 | 42 | | | | | | | | | | |
| | | | | | Stiff dark gray clay w/trace of roots | CH | PB-5 | 7 | | | | | | | | | | | |
| | | | | | | | PB-6 | 9 | 42 | | | | | | 100 | 30 | 70 | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

**Boring: A-7**

**Project No:** L0474
**Date:** 12/19/2016
**Latitude:** 29.99403°
**Longitude:** -91.75685°

**Elevation:** 12.8
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Medium stiff light gray & tan silty clay w/trace of silt pockets & concretions (possible fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 22 | | | | | | 38 | 20 | 18 | | |
| | | | | | Soft to medium stiff gray silty clay w/trace of concretions, sand, & organic matter | CL | PB-3 | 3 | 23 | | | | | | 32 | 21 | 11 | | -#200 = 95.0%, PD |
| 5 | | | | | Medium stiff greenish-gray & tan clay | CH | PB-4 | 5 | | | | | | | | | | | |
| | | | | | | | PB-5 | 7 | 46 | | | | | | 113 | 22 | 91 | | |
| | | | | | | | PB-6 | 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS ENGINEERING SINCE 1946

# LOG OF BORING AND TEST RESULTS

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: A-8

**Project No:** L0474
**Date:** 12/20/2016
**Latitude:**
**Longitude:**

**Elevation:** 17.0
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Soft brown silty clay (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | Medium stiff brown silty clay w/trace of roots (possible fill) | CL | PB-2 | 1 | 23 | | | | | | | | | | |
| | | | | | Medium stiff dark gray clay | CH | PB-3 | 3 | 37 | | | | | | | | | | |
| 5 | | | | | Medium stiff gray clay w/silt, trace of concretions, & sand | CH | PB-4 | 5 | 46 | | | | | | 98 | 31 | 67 | | -#200 = 99.3% PD |
| | | | | | Stiff gray & tan clay w/trace of concretions | CH | PB-5 | 7 | | | | | | | | | | | |
| | | | | | | | PB-6 | 9 | 48 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

**Boring: A-9**

**Project No:** L0474
**Date:** 12/16/2016
**Latitude:** 29.99393°
**Longitude:** -91.75800°

**Elevation:** 16.8
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Medium stiff brown silty clay w/sand, trace of concretions, & organic matter (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 17 | | | | | | 43 | 17 | 26 | | -#200 = 94.2%, PD |
| | | | | | Medium stiff light gray & brown silty clay w/trace of concretions (fill) | CL | PB-3 | 3 | 22 | | | | | | | | | | |
| 5 | | | | | Soft to medium stiff gray & tan silty clay w/trace of silt pockets & concretions (possible fill) | CL | PB-4 | 5 | | | | | | | | | | | |
| | | | | | | | PB-5 | 7 | 26 | | | | | | | | | | |
| | | | | | | | PB-6 | 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

**Boring: A-10**

**Project No:** L0474
**Date:** 12/16/2017
**Latitude:** 29.99398°
**Longitude:** -91.75790°

**Elevation:** 17.0
**Datum:**
**Water Depth:** See Text
**Total Depth:** 10.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Soft tan & light gray silty clay w/trace of clay pockets, concretions, & roots (fill) | CL | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 21 | | | | | | | | | | |
| | | | | | Soft to medium stiff brown & gray silty clay w/concretions, trace of sand, & organic matter (possible fill) | CL | PB-3 | 3 | 25 | | | | | | 39 | 20 | 19 | | -#200 = 96.9%, PD |
| 5 | | | | | | | PB-4 | 5 | | | | | | | | | | | |
| | | | | | Medium stiff gray clay w/trace of silt pockets | CH | PB-5 | 7 | | | | | | | | | | | |
| | | | | | | | PB-6 | 9 | 49 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

**Boring: A-11**

**Project No:** L0474
**Date:** 12/20/2016
**Latitude:** 29.99022°
**Longitude:** -91.75892°

**Water Depth:** See Text
**Total Depth:** 8.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Medium stiff gray & tan clay w/trace of roots & shell fragments | CH | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 51 | | | | | | 105 | 27 | 78 | | |
| | | | | | w/trace of silt pockets, roots, & concretions | | PB-3 | 3 | | | | | | | | | | | |
| 5 | | | | | | | PB-4 | 5 | 37 | | | | | | | | | | |
| | | | | | Soft to medium stiff gray silty clay w/silty sand pockets & trace of concretions | CL | PB-5 | 7 | 32 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

**NOTES:**

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: A-12

**Project No:** L0474
**Date:** 12/20/2016
**Latitude:** 29.99123°
**Longitude:** -91.75838°

**Water Depth:** See Text
**Total Depth:** 8.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Stiff dark gray clay w/few shell fragments, silt pockets, & trace of organic matter | CH | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 30 | | | | | | 73 | 20 | 53 | | |
| | | | | | Stiff gray clay w/trace of concretions | CH | PB-3 | 3 | | | | | | | | | | | |
| 5 | | | | | | | PB-4 | 5 | 43 | | | | | | | | | | |
| | | | | | | | PB-5 | 7 | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

## Boring: A-13

**Project No:** L0474
**Date:** 12/20/2016
**Latitude:** 29.99198°
**Longitude:** -91.75795°

**Water Depth:** See Text
**Total Depth:** 8.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Medium stiff dark gray & gray clay w/trace of silt pockets | CH | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 47 | | | | | | 108 | 26 | 82 | | |
| | | | | | Medium stiff gray & tan clay w/trace of concretions & organic matter | CH | PB-3 | 3 | 45 | | | | | | | | | | |
| 5 | | | | | Soft to medium stiff gray clay | CH | PB-4 | 5 | 40 | | | | | | | | | | |
| | | | | | | | PB-5 | 7 | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

# LOG OF BORING AND TEST RESULTS

EUSTIS ENGINEERING SINCE 1946

**City of New Iberia**
**Tete Bayou Wastewater Treatment Plant**
**Equalization Basin Levee Repairs**
**Iberia Parish, Louisiana**

**Boring: A-14**

**Project No:** L0474
**Date:**
**Latitude:** 29.99273°
**Longitude:** -91.75762°

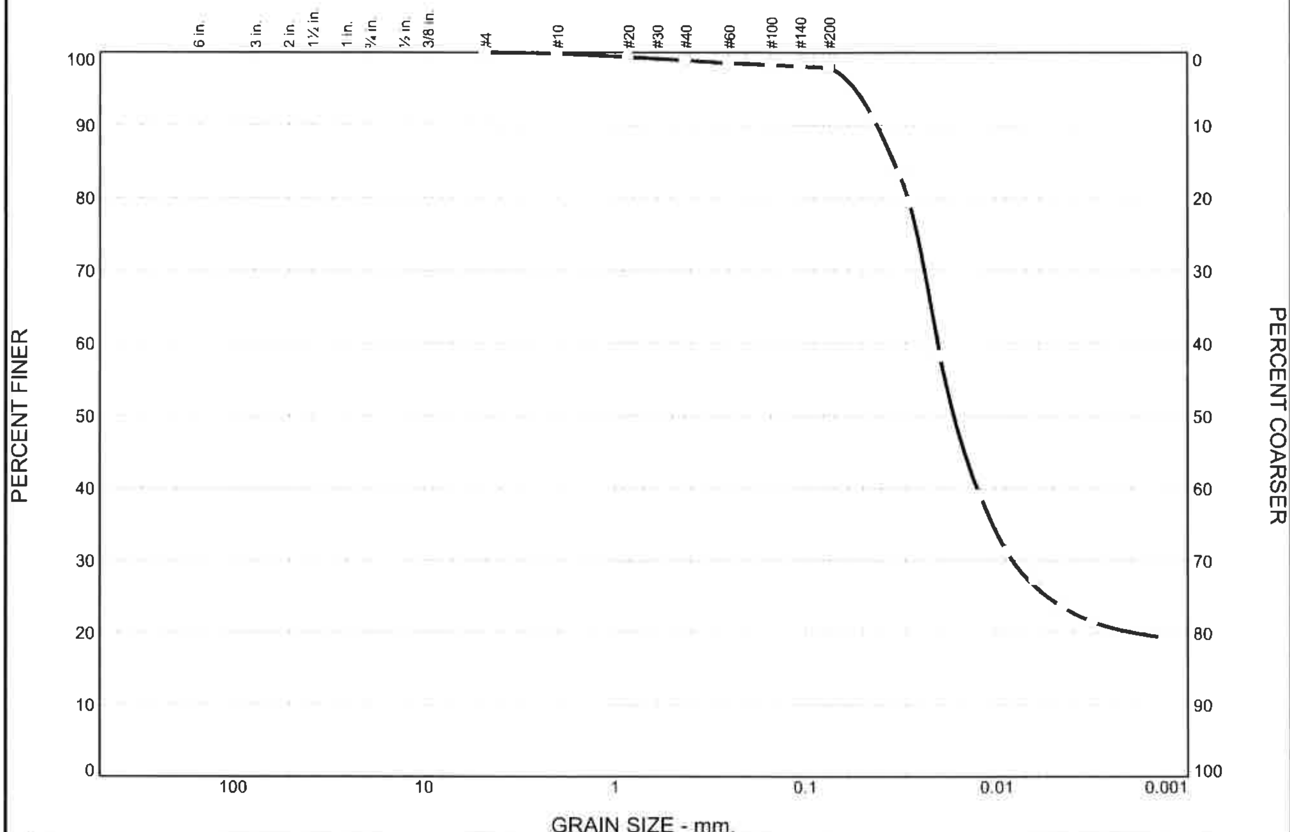
**Water Depth:** See Text
**Total Depth:** 8.0 ft

| Scale in Feet | PP | SPT | SPLR | Symbol | Visual Classification | USC | Sample Number | Depth in Feet | Water Content % | Density Dry pcf | Density Wet pcf | Shear Tests Type | Shear Tests ϕ | Shear Tests C psf | Atterberg Limits LL | Atterberg Limits PL | Atterberg Limits PI | | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Soft to medium stiff gray clay w/roots, trace of silt pockets, & concretions | CH | PB-1 | 0 | | | | | | | | | | | |
| | | | | | | | PB-2 | 1 | 45 | | | | | | 96 | 29 | 67 | | |
| | | | | | Medium stiff gray clay w/trace of concretions & roots | CH | | | | | | | | | | | | | |
| | | | | | | | PB-3 | 3 | 46 | | | | | | | | | | |
| 5 | | | | | | | PB-4 | 5 | | | | | | | | | | | |
| | | | | | | | PB-5 | 7 | 46 | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | |

**NOTES:**

EUSTIS GINT LIBRARY012017.GLB EE STANDARD BORING LOG L0474.GPJ 7/25/17

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.2 | 0.9 | 1.0 | 73.6 | 24.3 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 44 | 17 | 0.0347 | 0.0204 | 0.0168 | 0.0083 | | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Medium Stiff Brown and Tan Silty Clay W/ Some Roots. Traces of Clay Pockets and Lenses (Brittle) | CL | A-7-6(28) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.
**Project:** NEW IBERIA CITY OF -TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA
**Source of Sample:** B-1 **Depth:** 2 **Sample Number:** 2

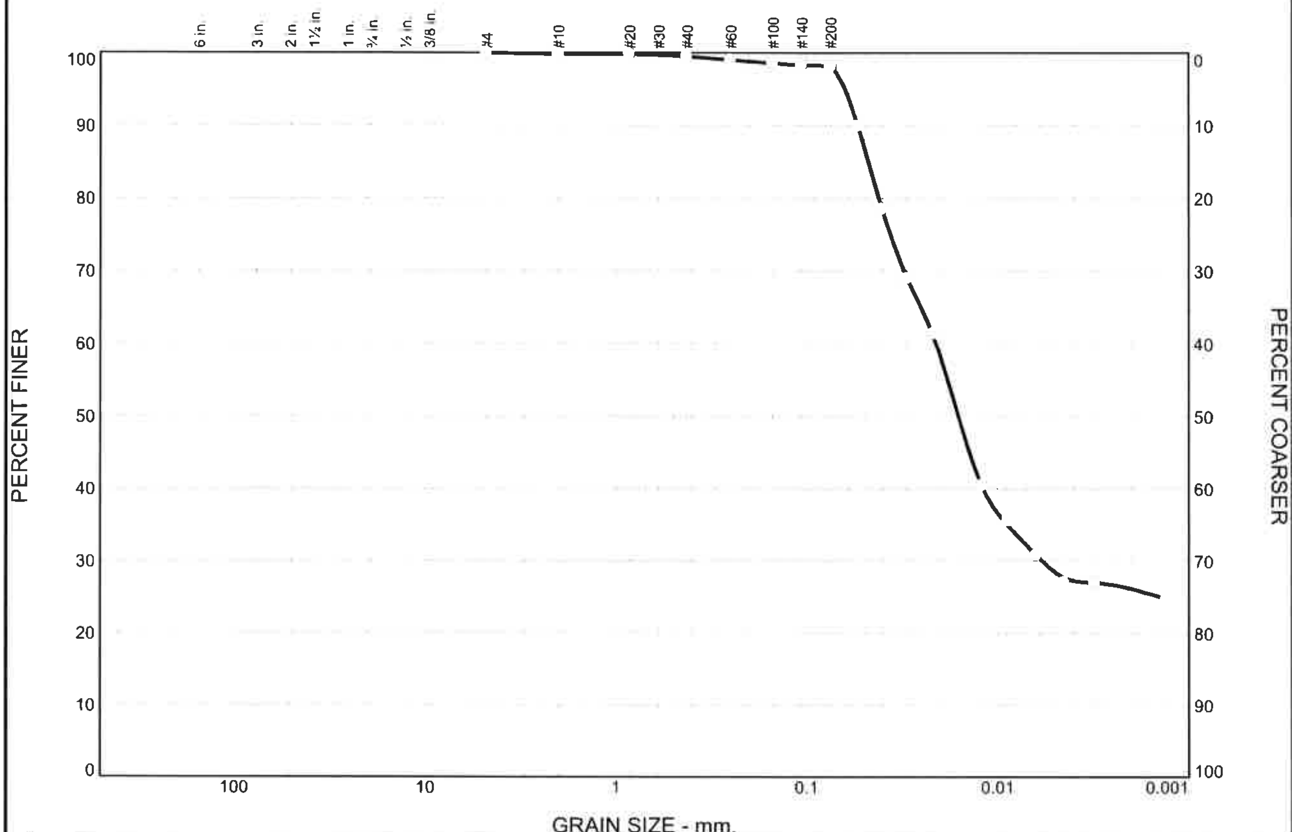
**Remarks:**
Specific Gravity was Estimated

EUSTIS ENGINEERING

**Figure**

**Tested By:** SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 1.4 | 69.6 | 28.5 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 39 | 19 | 0.0477 | 0.0210 | 0.0161 | 0.0058 | | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Hard Light Brown and Tan Silty Clay W/ Trace of Concretions (Brittle) | CL | A-6(21) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.

**Project:** NEW IBERIA CITY OF -TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA

**Source of Sample:** B-1 **Depth:** 8 **Sample Number:** 4

**Remarks:**
Specific Gravity was Estimated

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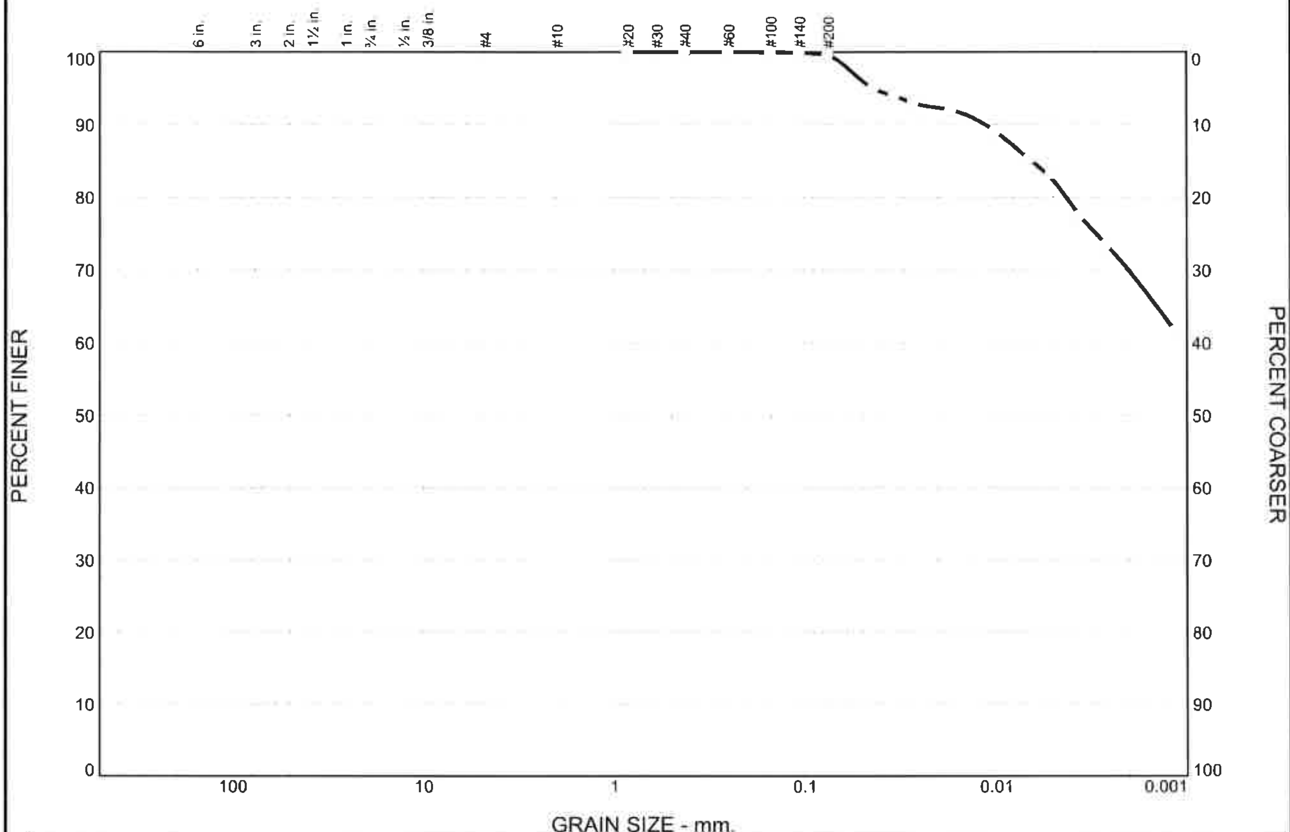
**Figure**

**Tested By:** SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 17.3 | 82.3 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 86 | 23 | 0.0065 | | | | | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Medium Stiff Gray and Tan Clay W/ Traces of Silt Pockets and Concretions (Flocculated) | CH | A-7-6(73) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.
**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA
**Source of Sample:** B-2 **Depth:** 18 **Sample Number:** 7

**Remarks:**
Specific Gravity was Estimated

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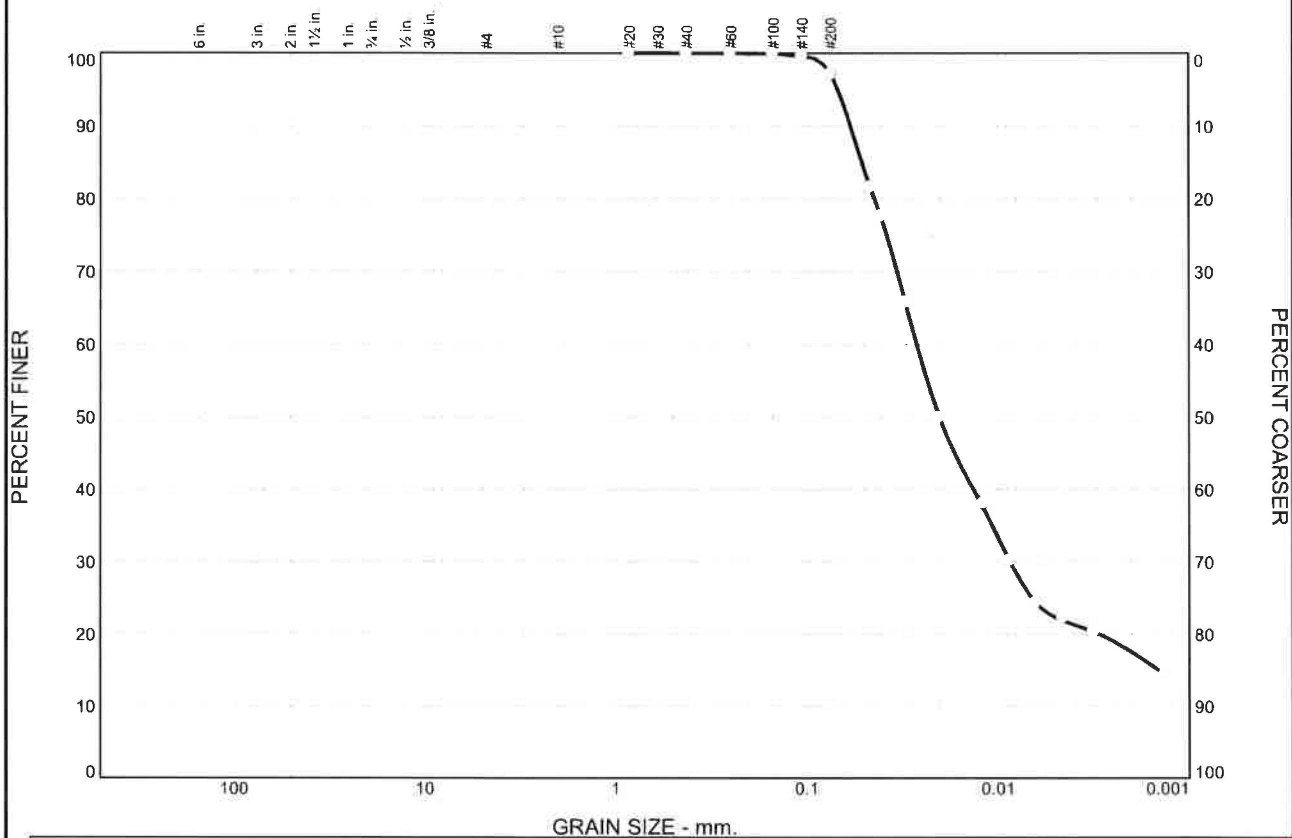
**Figure**

**Tested By:** BH & SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 | 74.8 | 22.3 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 28 | 22 | 0.0515 | 0.0266 | 0.0202 | 0.0087 | 0.0014 | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Soft Gray Silty Clay W/ Clayey Silt. Traces of Fine Sand and Concretions | CL-ML | A-4(5) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.

**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA

**Source of Sample:** B-3 **Depth:** 28 **Sample Number:** 9

**Remarks:**
Specific Gravity was Estimated

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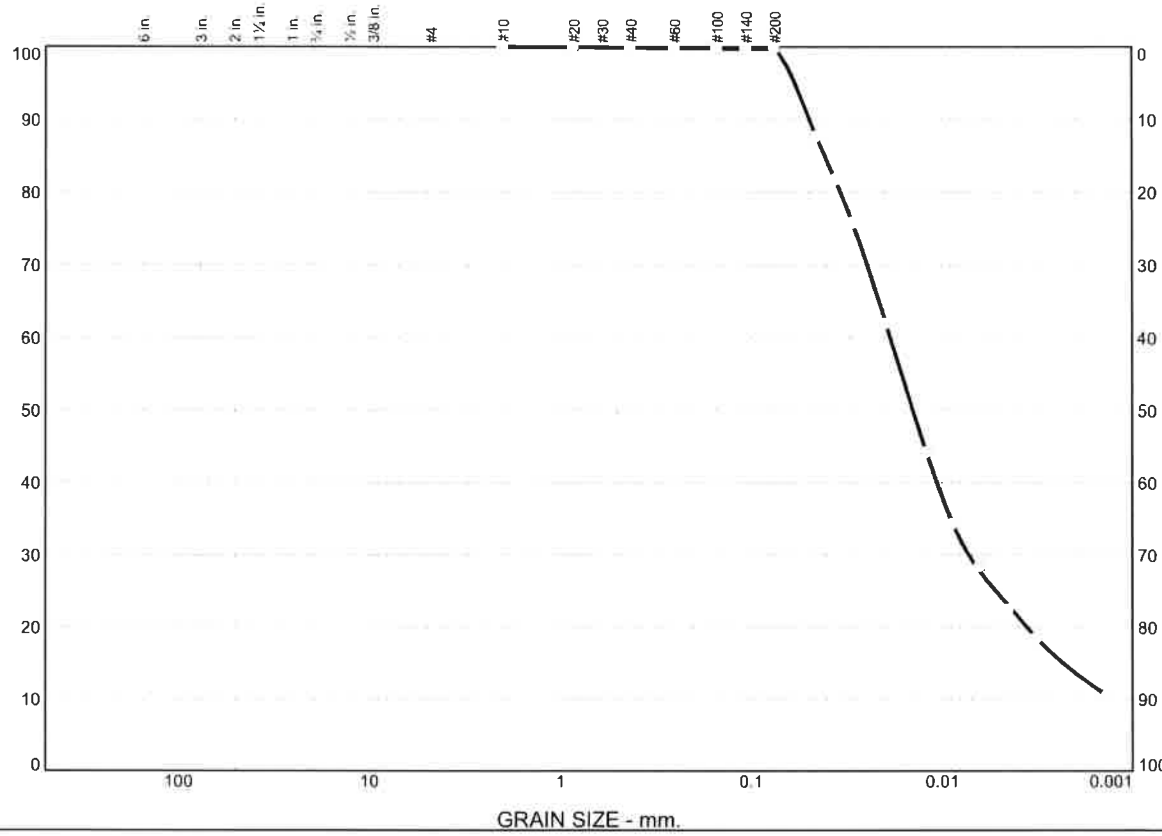
**Figure**

**Tested By:** BH **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 75.3 | 24.4 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 37 | 21 | 0.0411 | 0.0186 | 0.0142 | 0.0073 | 0.0023 | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Medium Stiff and Gray Silty Clay W/ Clayey Silt and Roots | CL | A-6(17) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.
**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA
**Source of Sample:** B-4 **Depth:** 5 **Sample Number:** 3

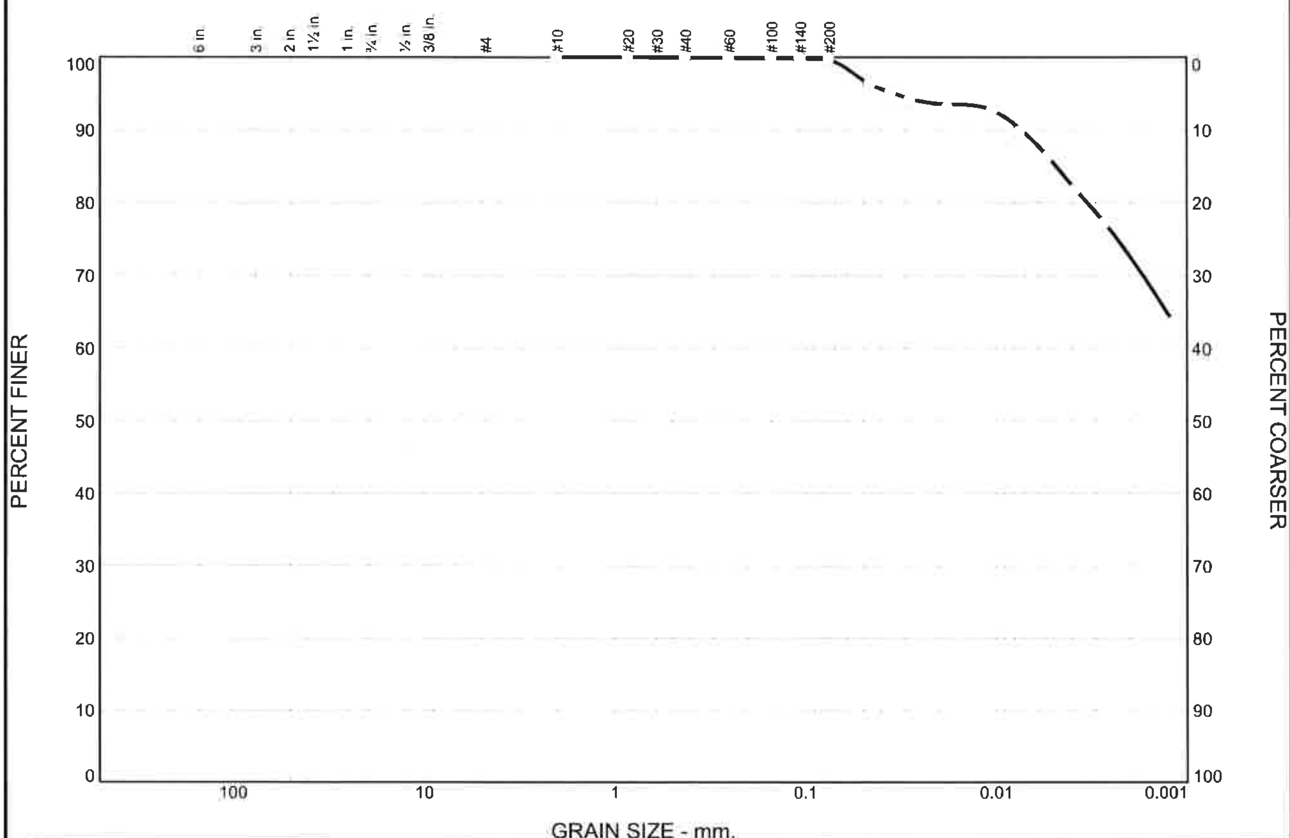
**Remarks:**
Specific Gravity was Estimated

EUSTIS ENGINEERING SINCE 1946

**Figure**

**Tested By:** BH & SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 14.2 | 85.5 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 101 | 31 | 0.0048 | | | | | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Medium Stiff Greenish Gray and Dark Gray Clay W/ Trace of Silt Pockets | CH | A-7-5(84) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.

**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA

**Source of Sample:** B-4 **Depth:** 11 **Sample Number:** 5

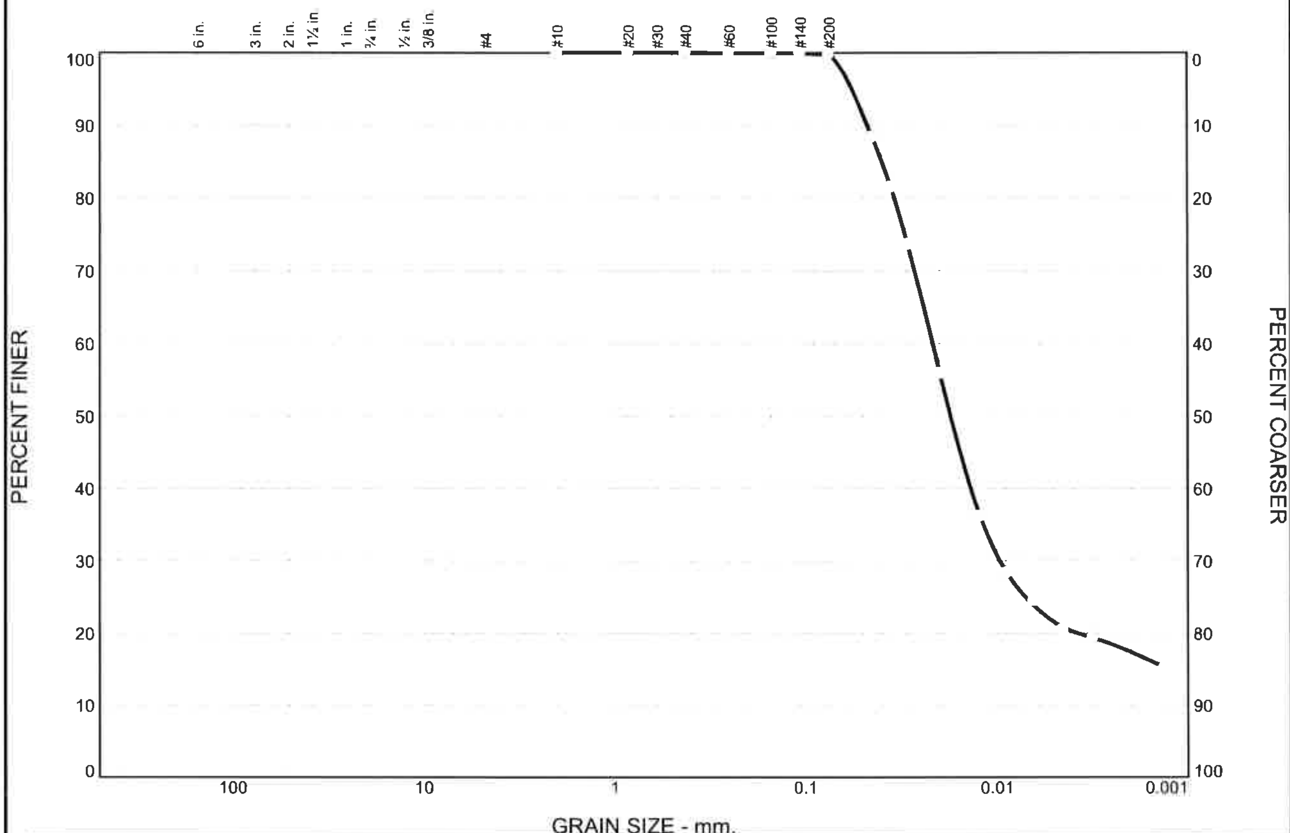
**Remarks:**
Specific Gravity was Estimated

EUSTIS ENGINEERING SINCE 1946

**Figure**

**Tested By:** BH & SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 78.3 | 21.5 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 72 | 19 | 0.0399 | 0.0217 | 0.0174 | 0.0097 | | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Stiff Light Brown and Gray Clay W/ Silt Pockets. Traces of Sand. Concretions. Roots and Organic Matter | CH | A-7-6(60) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.
**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA
**Source of Sample:** B-5 **Depth:** 11 **Sample Number:** 5

**Remarks:**
Specific Gravity was Estimated

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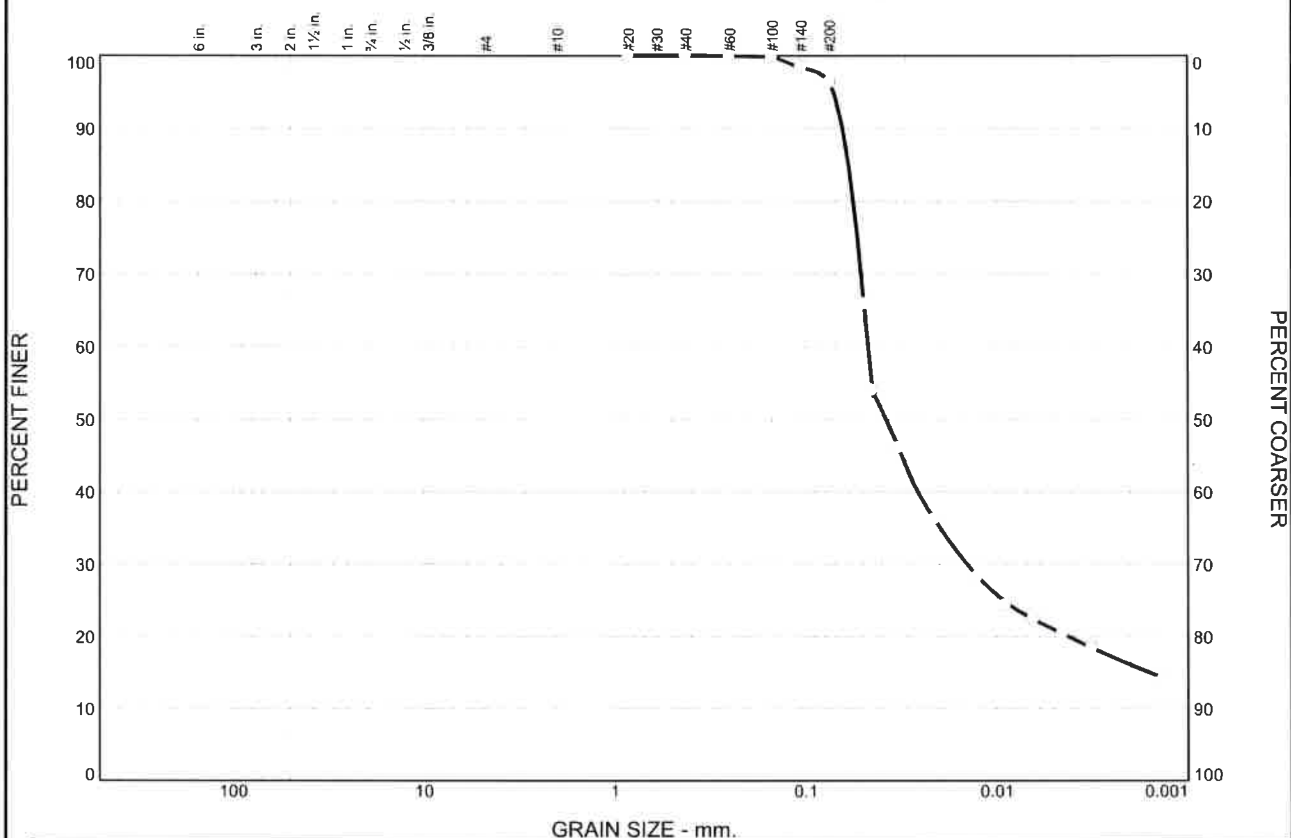
**Figure**

**Tested By:** BH & SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 75.3 | 21.0 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 31 | 18 | 0.0598 | 0.0475 | 0.0381 | 0.0143 | 0.0016 | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Soft Gray Silty Clay W/ Trace of Clayey Silt Pockets, Sand and Organic Matter | CL | A-6(12) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA, WASTEWATER DEPARTMENT,
**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS, IBERIA PARISH, LOUISIANA
**Source of Sample:** B-5 **Depth:** 28 **Sample Number:** 9

**Remarks:**
Specific Gravity was Estimated

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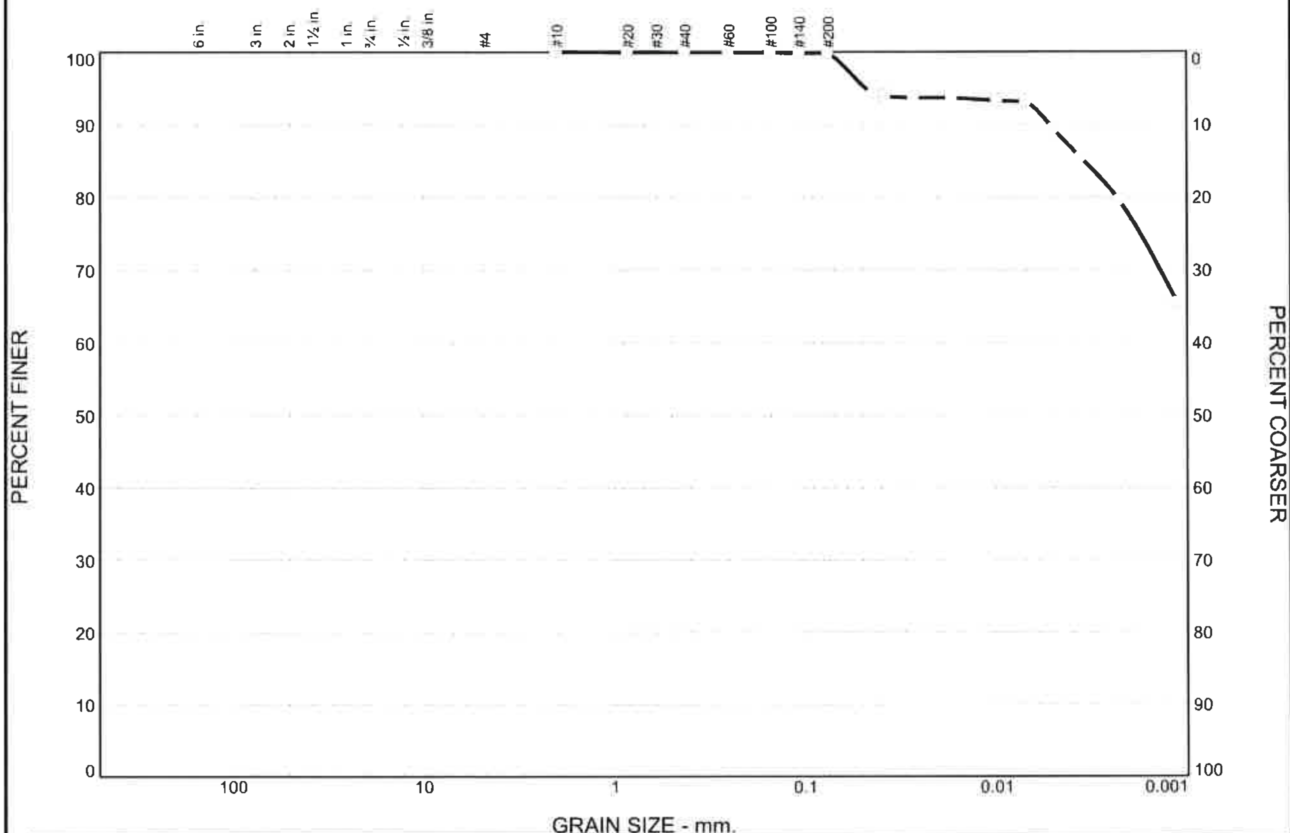
**Figure**

**Tested By:** BH & SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 10.4 | 89.4 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 91 | 24 | 0.0035 | | | | | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Very Stiff Gray and Tan Clay W/ Concretions, Few Silt Pockets (Flocculated) | CH | A-7-6(78) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA, WASTEWATER DEPARTMENT

**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS, IBERIA PARISH, LOUISIANA

**Source of Sample:** B-6 **Depth:** 8 **Sample Number:** 4

**Remarks:**
Specific Gravity was Estimated

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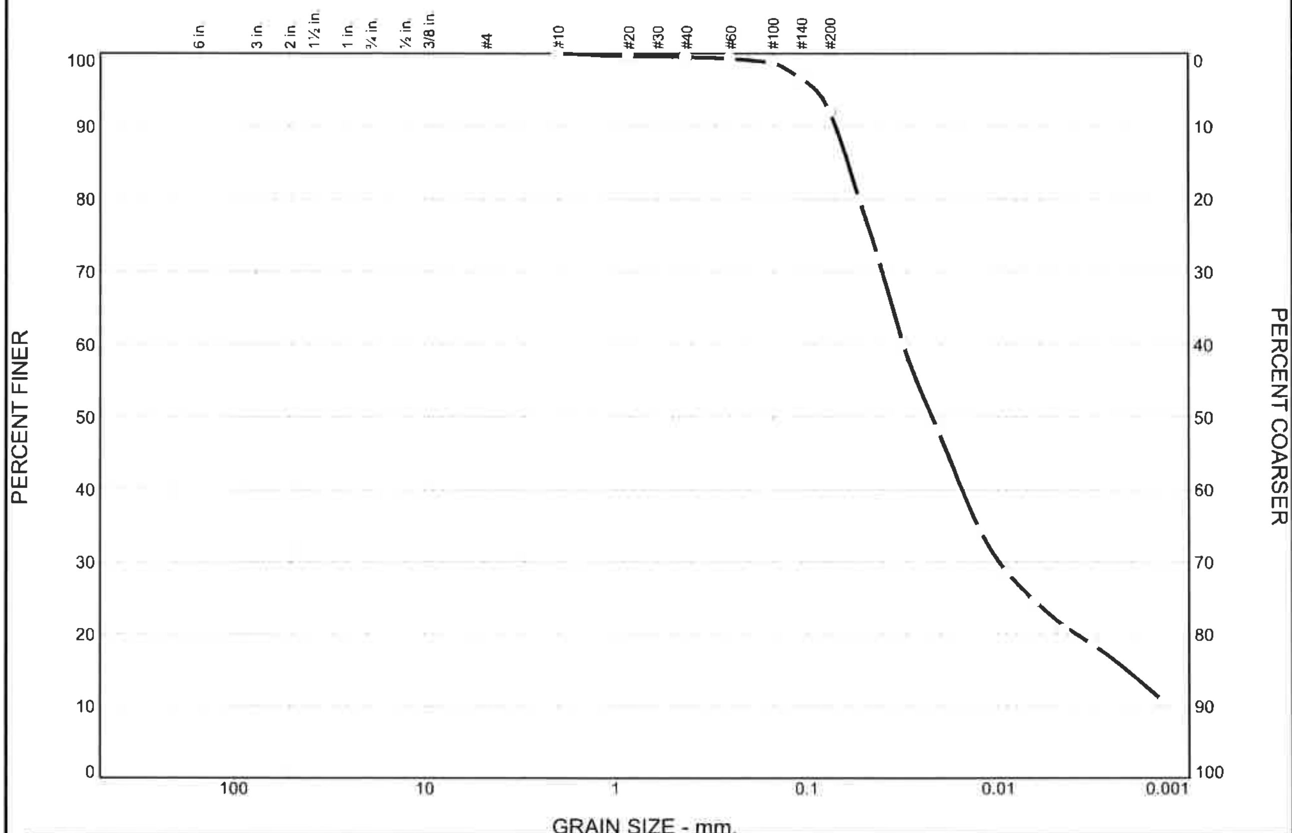
**Figure**

**Tested By:** BH & SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 7.6 | 69.9 | 22.0 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 31 | 20 | 0.0606 | 0.0312 | 0.0221 | 0.0099 | 0.0021 | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Soft Gray Silty Clay W/ Clayey Silt Len. Few Sand & Organic Matter. Trace of Concretions (Brittle) | CL | A-6(10) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.

**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA

**Source of Sample:** B-6 **Depth:** 28 **Sample Number:** 9

**Remarks:**

Specific Gravity was Estimated

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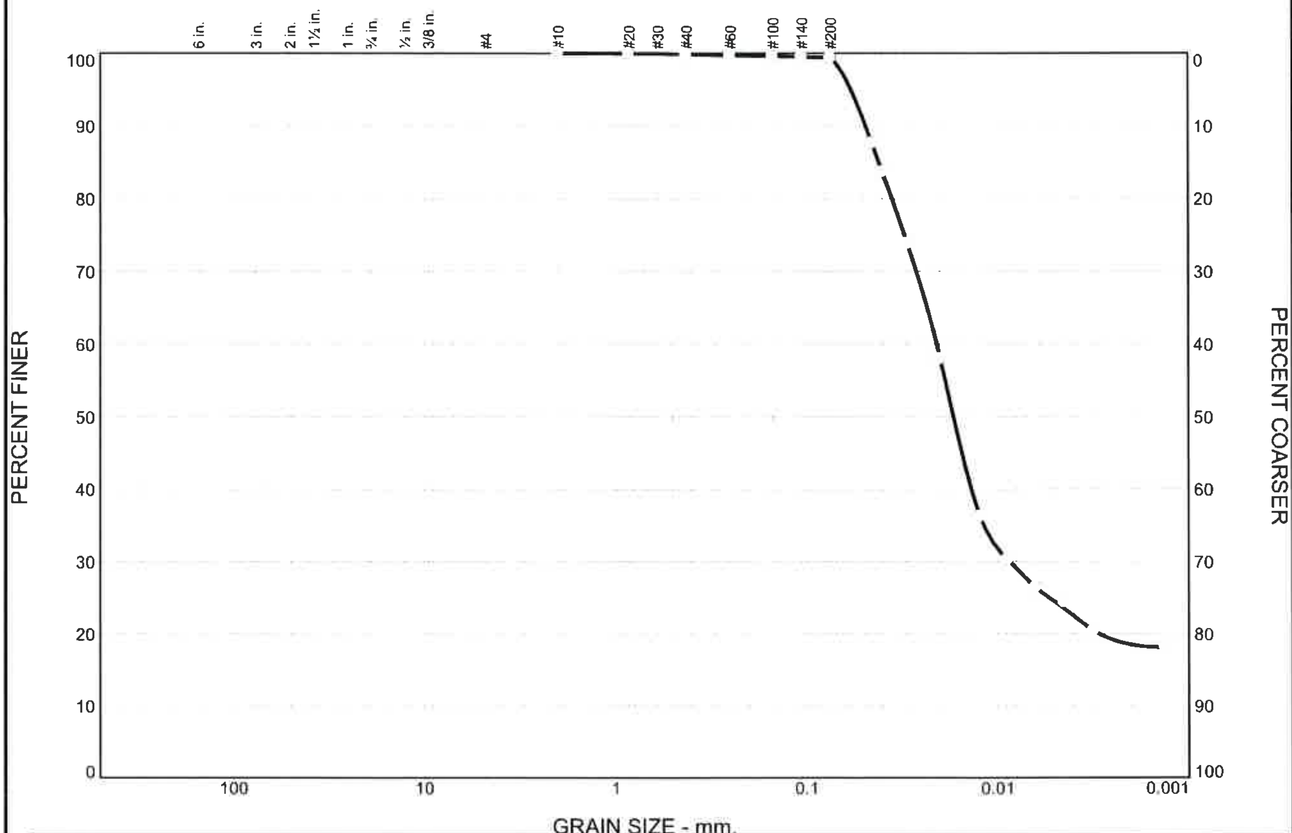
**Figure**

**Tested By:** BH & SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 75.1 | 24.3 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 46 | 21 | 0.0417 | 0.0207 | 0.0169 | 0.0087 | | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Very Stiff Tan and Light Brown Silty Clay W/ Some Roots and Organic Matter. Few Silt Pockets. Traces | CL | A-7-6(27) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.

**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA

**Source of Sample:** B-7 **Depth:** 2 **Sample Number:** 2

**Remarks:**
of Sand and Concretions (Brittle)
Specific Gravity was Estimated

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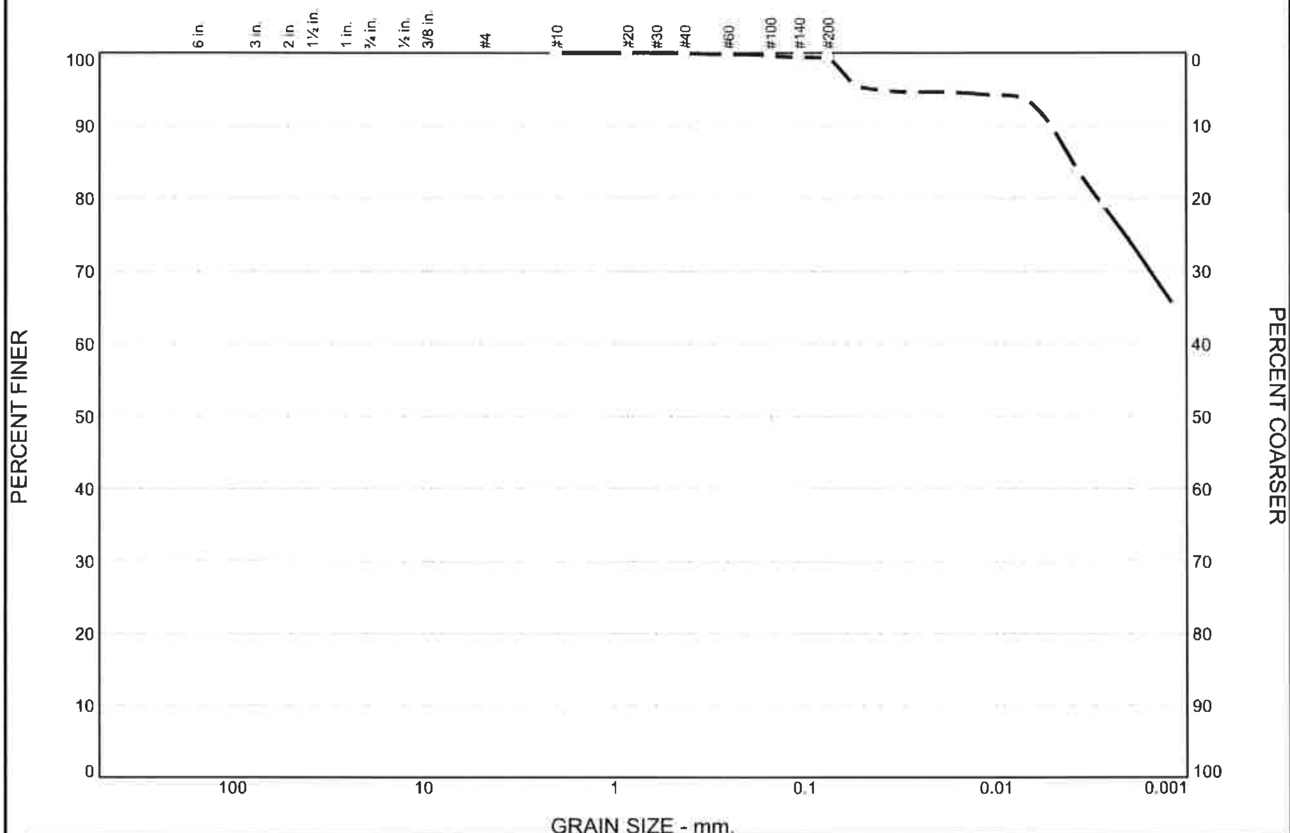
**Figure**

**Tested By:** BH & SWV **Checked By:** CD

# Particle Size Distribution Report




| % +3" | % Gravel Coarse | % Gravel Fine | % Sand Coarse | % Sand Medium | % Sand Fine | % Fines Silt | % Fines Clay |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 9.8 | 89.6 |

| LL | PL | $D_{85}$ | $D_{60}$ | $D_{50}$ | $D_{30}$ | $D_{15}$ | $D_{10}$ | $C_c$ | $C_u$ |
|---|---|---|---|---|---|---|---|---|---|
| 100 | 26 | 0.0039 | | | | | | | |

| Material Description | USCS | AASHTO |
|---|---|---|
| Medium Stiff Light Gray and Tan Clay W/ Some Concretions and Silt Pockets. Traces of Sand and | CH | A-7-6(86) |

**Project No.** L0474 **Client:** CITY OF NEW IBERIA. WASTEWATER DEPARTMENT.

**Project:** NEW IBERIA CITY OF - TETE BAYOU WASTEWATER TREATMENT PLANT EQUALIZATION BASIN LEVEE REPAIRS. IBERIA PARISH. LOUISIANA

**Source of Sample:** B-7 **Depth:** 18 **Sample Number:** 7

**Remarks:**
Organic Matter (Flocculated)
Specific Gravity was Estimated

EUSTIS ENGINEERING

**Figure**

**Tested By:** BH & SWV **Checked By:** CD

APPENDIX II

SCALE: 1" = 30'
N
Chainlink Fence
OHE
OHE
OHE
CRIMSON GULF, LLC
ENTERPRISE PIPELINE

APPENDIX III

Tensar International Corporation
5883 Glenridge Drive, Suite 200
Atlanta, Georgia 30328-5363
Phone: 800-TENSAR-1
www.tensar-international.com

# Product Specification - Biaxial Geogrid BX1200

*Tensar International Corporation reserves the right to change its product specifications at any time. It is the responsibility of the specifier and purchaser to ensure that product specifications used for design and procurement purposes are current and consistent with the products used in each instance.*

| | |
|---|---|
| **Product Type:** | **Integrally Formed Biaxial Geogrid** |
| **Polymer:** | **Polypropylene** |
| **Load Transfer Mechanism:** | **Positive Mechanical Interlock** |
| **Primary Applications:** | **Spectra System (Base Reinforcement, Subgrade Improvement)** |

**Product Properties**

| Index Properties | Units | MD Values[1] | XMD Values[1] |
|---|---|---|---|
| ▪ Aperture Dimensions[2] | mm (in) | 25 (1.0) | 33 (1.3) |
| ▪ Minimum Rib Thickness[2] | mm (in) | 1.27 (0.05) | 1.27 (0.05) |
| ▪ Tensile Strength @ 2% Strain[3] | kN/m (lb/ft) | 6.0 (410) | 9.0 (620) |
| ▪ Tensile Strength @ 5% Strain[3] | kN/m (lb/ft) | 11.8 (810) | 19.6 (1,340) |
| ▪ Ultimate Tensile Strength[3] | kN/m (lb/ft) | 19.2 (1,310) | 28.8 (1,970) |
| **Structural Integrity** | | | |
| ▪ Junction Efficiency[4] | % | 93 | |
| ▪ Flexural Stiffness[5] | mg-cm | 750,000 | |
| ▪ Aperture Stability[6] | m-N/deg | 0.65 | |
| **Durability** | | | |
| ▪ Resistance to Installation Damage[7] | %SC / %SW / %GP | 95 / 93 / 90 | |
| ▪ Resistance to Long Term Degradation[8] | % | 100 | |
| ▪ Resistance to UV Degradation[9] | % | 100 | |

**Dimensions and Delivery**

The biaxial geogrid shall be delivered to the jobsite in roll form with each roll individually identified and nominally measuring 3.0 meters (9.8 feet) or 4.0 meters (13.1 feet) in width and 50.0 meters (164 feet) in length. A typical truckload quantity is 160 to 210 rolls.

**Notes**

1. Unless indicated otherwise, values shown are minimum average roll values determined in accordance with ASTM D4759-02. Brief descriptions of test procedures are given in the following notes.
2. Nominal dimensions.
3. True resistance to elongation when initially subjected to a load determined in accordance with ASTM D6637-01 without deforming test materials under load before measuring such resistance or employing "secant" or "offset" tangent methods of measurement so as to overstate tensile properties.
4. Load transfer capability determined in accordance with GRI-GG2-05 and expressed as a percentage of ultimate tensile strength.
5. Resistance to bending force determined in accordance with ASTM D5732-01, using specimens of width two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs (as a "ladder"), and of length sufficiently long to enable measurement of the overhang dimension. The overall Flexural Stiffness is calculated as the square root of the product of MD and XMD Flexural Stiffness values.
6. Resistance to in-plane rotational movement measured by applying a 20 kg-cm (2 m-N) moment to the central junction of a 9 inch x 9 inch specimen restrained at its perimeter in accordance with U.S. Army Corps of Engineers Methodology for measurement of Torsional Rigidity.
7. Resistance to loss of load capacity or structural integrity when subjected to mechanical installation stress in clayey sand (SC), well graded sand (SW), and crushed stone classified as poorly graded gravel (GP). The geogrid shall be sampled in accordance with ASTM D5818-06 and load capacity shall be determined in accordance with ASTM D6637-01.
8. Resistance to loss of load capacity or structural integrity when subjected to chemically aggressive environments in accordance with EPA 9090 immersion testing.
9. Resistance to loss of load capacity or structural integrity when subjected to 500 hours of ultraviolet light and aggressive weathering in accordance with ASTM D4355-05.

Tensar International Corporation warrants that at the time of delivery the geogrid furnished hereunder shall conform to the specification stated herein. Any other warranty including merchantability and fitness for a particular purpose, are hereby excluded. If the geogrid does not meet the specifications on this page and Tensar is notified prior to installation, Tensar will replace the geogrid at no cost to the customer.

This product specification supersedes all prior specifications for the produc described above and is not applicable to any products shipped prior to June 1, 2007

17 November 2017

City of New Iberia
Wastewater Department
800 Sucrose Drive
New Iberia, Louisiana 70560

Attention Mr. Vincent S. Palumbo, II, P.E.
PN 1-337-369-2362
FN 1-337-369-2366
Email vpalumbo@cityofnewiberia.com

Ladies and Gentlemen:

Additional Geotechnical Engineering Analyses
City of New Iberia
Tete Bayou Wastewater Treatment Plant
Equalization Basin Levee Repairs
Iberia Parish, Louisiana
Eustis Engineering Project No. L0474

Transmitted are the results of additional geotechnical engineering analyses performed for the subject project. Reference is made to our report entitled "Geotechnical Exploration, City of New Iberia, Tete Bayou Wastewater Treatment Plant, Equalization Basin Levee Repairs, Iberia Parish, Louisiana, Eustis Engineering Project No. L0474," dated 21 August 2017. We understand consideration is being given to substituting the earthen berms, recommended in our referenced report, with crushed stone to facilitate construction in a potentially wet basin bottom. Eustis Engineering was asked to evaluate the use of crushed stone within the recommended berms.

Crushed Stone Stability Berms. In our referenced report, Eustis Engineering recommended a stability berm be constructed. This was illustrated on Figure 4 of our referenced report and assumed clay would be used as structural fill. Considering the use of crushed stone for constructing the berm, our analyses indicated an acceptable factor of safety would be provided. Our analyses assumed a minimum wet density of 135 pcf is provided by the crushed stone. The results of these analyses are shown on the Enclosure. Based on the current and previous analyses, a composite berm consisting of crushed stone at the bottom and clay on the top will also provide an acceptable factor of safety. Should a clay cover be desired for vegetation growth or maintenance, we recommend a minimum clay cover of 2 feet meeting the material requirements given in our referenced report. Material separation should be provided between the clay and crushed stone. We have assumed an over excavation of 2 feet for removal of soft muck.

Material Separation. Prior to placing the crushed stone, material separation should be provided between the natural subgrade and the crushed stone to prevent infiltration of foreign materials. Material separation is also applicable if a clay cover is desired over crushed stone. Material separation may be provided by a geotextile.

Geotextile. The geotextile separation fabric should meet or exceed the material requirements for Class C geotextile presented in Section 1019.01 of the Louisiana Standard Specifications for Roads and Bridges (LSSRB), 2006 edition. The geotextile should be placed directly on the undisturbed soils in accordance with the manufacturer's construction recommendations. All seams in the geotextile should be properly overlapped and secured to provide adequate material separation. The geotextile should also be placed in accordance with the manufacturer's recommendations.

Crushed stone should conform to the requirements of Section 1003.08(a) of the LSSRB. The crushed stone above the over excavation should generally be placed in lifts of 6 to 8 inches (loose measure) and compacted to 95% of its maximum dry density determined in accordance with ASTM D 698. Crushed stone within the over excavation should be bucket tamped until a stable platform has been established and the above compaction criteria can be met.

Other Considerations. Recommendations in our referenced report not specifically addressed in this letter remain valid. Should any of our assumptions not be met, Eustis Engineering should be contacted to evaluate the effects on our recommendations.

We hope this fulfills your immediate needs for the project. Should you have any questions or require any additional information, please do not hesitate to contact us.

Yours very truly,

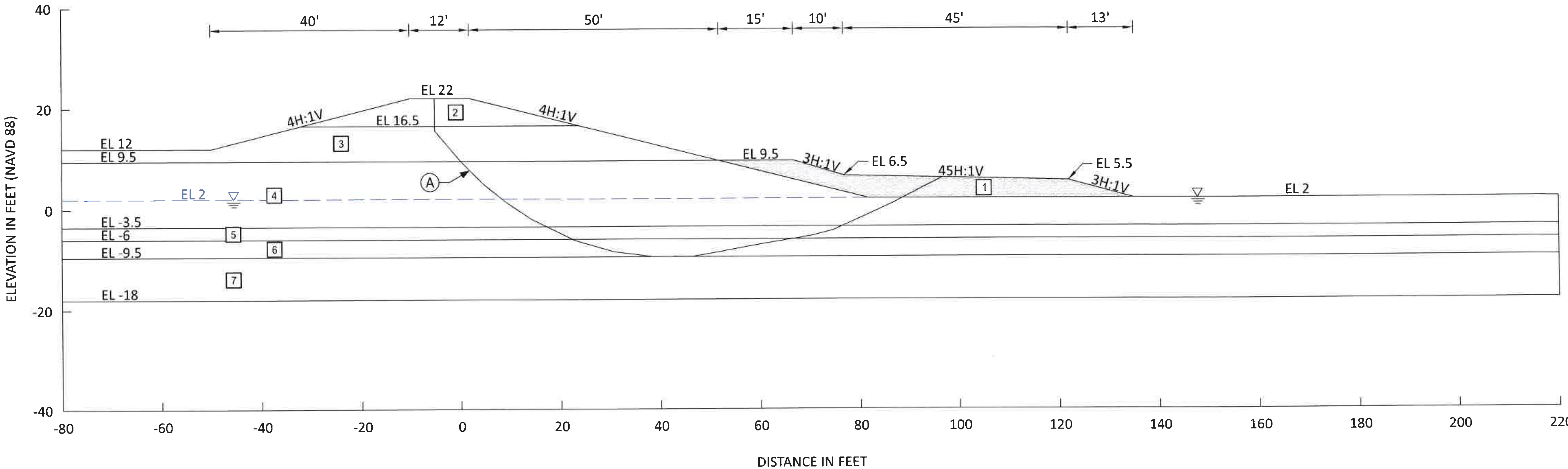
EUSTIS ENGINEERING L.L.C.

STATE OF LOUISIANA
SHAUN R. SIMON
License No. 31557
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

SHAUN R. SIMON, P.E.

SRS:brp/mrd

Enclosure




| TABLE 1: DESIGN VALUES | | | | | |
|---|---|---|---|---|---|
| SOIL NO. | DESCRIPTION | FRICTION ANGLE IN DEGREES(1) | UNIT WEIGHT IN PCF | COHESION AVG. | COHESION BASE |
| 1 | LIMESTONE | 35 | 135 | 0 | 0 |
| 2 | LEVEE | NL1 | 126 | — | — |
| 3 | CLAY | NL2 | 126 | — | — |
| 4 | CLAY | NL3 | 126 | — | — |
| 5 | CLAY | NL3 | 119 | — | — |
| 6 | CLAY | NL3 | 120 | — | — |
| 7 | CLAY | 23 | 120 | 0 | 0 |

(1) REFER TO TABLE 2 FOR NON-LINEAR (NL) STRENGTH DATA

| TABLE 2: NON-LINEAR STRENGTH ENVELOPES | | | |
|---|---|---|---|
| NORMAL EFFECTIVE STRESS (PSF) | SHEAR STRENGTH (PSF) NL1 | NL2 | NL3 |
| 0 | 0 | 0 | 0 |
| 1044 | 650 | 485 | 255 |
| 2089 | 1160 | 820 | 450 |
| 8354 | 4090 | 2700 | 1460 |

| TABLE 3: SUMMARY OF RESULTS | | | | |
|---|---|---|---|---|
| SLIP DESIGNATION | TYPE OF SEARCH | MINIMUM COMPUTED FACTOR OF SAFETY | MINIMUM REQUIRED FACTOR OF SAFETY | SUBFILE NAME |
| A | ENTRY EXIT | 1.49 | 1.40 | EE A BERM 3 |
| SLOPE/W FILE NAME: L0474 - S-CASE GRA CALIBRATED.GSZ | | | | |

**NOTES:**

1. SLOPE STABILITY ANALYSES PERFORMED BY SPENCER'S METHOD OF SLICES USING SLOPE/W SOFTWARE, VERSION 8.16.1.13452.
2. SURVEY DATA DEVELOPED BY PAUL C. PRINCE, LLC.
3. NON-LINEAR STRENGTH DATA WAS ESTIMATED FROM DRAINED RESIDUAL AND FULLY SOFTENED FRICTION ANGLES BASED ON PLASTICITY CHARACTERISTICS AND ESTIMATED CLAY FRACTION AS SUGGESTED BY STARK AND HUSSAIN 2013, "EMPIRICAL CORRELATIONS; DRAINED SHEAR STRENGTH FOR SLOPE STABILITY ANALYSES," ASCE JOURNAL OF GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, VOLUME 139, ISSUE 6.

SLOPE STABILITY ANALYSES
SPENCER'S METHOD, S-CASE
DESIGN CONDITION WITH LIMESTONE BERM

CITY OF NEW IBERIA
TETE BAYOU WASTEWATER TREATMENT PLANT
EQUALIZATION BASIN LEVEE REPAIRS
IBERIA PARISH, LOUISIANA

EUSTIS

| | |
|---|---|
| DRAWN BY: J.L.S. | JOB NO.: L0474 |
| CHECKED BY: A.J.B. | DATE: 16 NOV 2017 |
| CADD FILE: S-CASE_LIMBERM.DGN | ENCLOSURE |

# Appendix 2 – Tete Bayou SSO Form

# NON COMPLIANCE REPORT FORM

**Date** 12 · 6, **20** 17

**CITY OF NEW IBERIA HWY 14 WWTP**
**800 SUCROSE DR., NEW IBERIA, LOUISIANA 70560**
**337-369-2362**
**LPDES NO. LA 0120201**
**AI # 106791**

MATERIAL RELEASED: Municipal wastewater
This is the written followup report to a release that caused an emergency condition ☐ YES ☑ NO

**(1) NON-COMPLIANCE:**

| Item | Date of Sample | Sample Result | Permit Limit |
|---|---|---|---|
| ☐ CBOD | | | |
| ☐ TSS | | | |
| ☐ Fecal Coliform | | | |
| ☐ pH Min. Max. | | | |
| ☐ Flow | | | |

Date & Time Incident: Began 12·6·17 6AM ~~12·6·17~~ ~~9AM~~ Ended 12·6·17 9Am
☐ By-Pass (chlorinated) at plant after primary treatment. Duration = ____(Hours)(Days) Est. Qty=____MG
☐ Overflow at plant prior to primary treatment. Duration = 3 (Hours)(Days) Est. Qty= 0.20 MG
☐ Overflow in collection system prior to primary treatment. Duration = ____(Hours)(Days) Est. Qty=____MG
☑ Other (explain) Over Flow @ Treatment Basin

**(2) CAUSE OF NON-COMPLIANCE**
☐ Pump Break Down ☑ Plant Repair Or Maintenance
☐ Plant Upset ☐ Chlorine Supply Exhausted Temporarily
☐ Chlorinator Out Of Service ☐ Other Equipment Breakdown
☐ Excessive I/I: Rainfall Intensity = ____ Inches in ____Hours.
☐ Other:____

**(3) LOCATION OF NON-COMPLIANCE:**
Specify Address, Lat/Lon, Manhole #, etc Aeration Basins 6, 7 And 8

**(4) ACTION TAKEN OR TO BE TAKEN TO REDUCE OR ELIMINATE NON-COMPLIANCE DISCHARGE:**
☐ Repair Equipment Immediately ☐ Stop Discharge Flow
☐ Obtain Supply Of Chlorine ☑ Implement Extra Maintenance Or Operation Procedures
☐ Increase Chlorination Of Discharge ☐ Request Public To Reduce Water Consumption & Sewage Discharge to collection System
☐ Reduce Discharge Flow
☐ Continue Implementation of I/I Control Program
☐ Other:____

**(5) IMPACTS**
Describe the location of where the discharge went (ie storm sewer, ditch, bayou, etc) Ditch
Was human health endangered? ☑ No ☐ Yes:____
Was the environment endangered? ☑ No ☐ Yes:____

**(7) INJURIES**
☑ None ☐ Yes, describe:____

**(8) PERSONNEL HAZARDS**
☑ None ☐ Yes, describe:____

**(9) EMERGENCY NOTIFICATION(only if release causes emergency condition):**
☐ **1-Hr. Oral Report Called to DPS (225) 925-6595 Date:**____ **Time:**____**(AM) (PM)**
Name of State Person Contacted: ____

**(10) POUNDS RELEASED 8.34 x 1,000,000 x # MG (in item 1.) =** 1,668,000 **lbs**

**PREPARED BY:** E. Mouton **(Supervisor)**

**SUBMITTED BY:** [signature] **(Wastewater Director)**

(Revised 06/23/2017; W\Treatment\Tete Bayou\NPDES\Noncompliance Report) This report is submitted in compliance with permit conditions found at Part III Section D.6.e: