Bayou Pattasat (City Barn)

Drainage Study ADDENDUM#1 – June 2014

For the

CITY OF SLIDELL

STATE OF LOUISIANA
SEAN M. BURKES
REG. No. 27642
REGISTERED PROFESSIONAL
CIVIL ENGINEERING
6-19-14

J.V. Burkes & Associates, Inc.
1805 Shortcut Hwy
Slidell, LA 70458

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APPENDIX

Executive Summary

This report was commissioned by GOHSEP to provide an analysis and evaluation of the current and prospective improvements for Bayou Pattasat within the City of Slidell. Methods of analysis include modifying an existing Corps HEC-RAS unsteady model of Eastern St. Tammany Parish by adding the Bayou Pattasat sub-basin, and performing soil borings. A summary of the calculations can be found in the appendix. Results of the analysis show that water levels can drop basin wide approximately 4"-5" for a total project cost of approximately $1,556,113.38. Recommendation includes a swapping out a 200 cfs pump for an old 67 cfs pump, straightening out a small section of Bayou and installing sheet piling in an existing problem area.

Introduction

The Bayou Pattasat(City Barn) channel improvement project is located in the old Town of Slidell area. The boundary is delineated to the west by Bayou Bonfouca, to the east by Hwy 11 (Front Street), to the south by property owned by Robin Goldsmith, et.al (leased by Textron), and to the north by property owned by the City of Slidell. A prior study was completed reviewing adding storage to the basin in the vicinity of the project area as shown below.

Figure 1. Vicinity Map - Bayou Pattasat/City Barn

It was determined that a conveyance issue occurred further upstream and an unknown factor with regard to the W-14 Drainage Canal flow spilling into this basin for any solutions that would be determined.

As a result of those questions, this updated model and analysis was authorized as addendum#1 to the original contract. The main scope was to look at a HEC-RAS unsteady model of the intermixing of the W-14, Bayou Bonfouca and Bayou Pattasat basins, look at proposed improvements and see what the basin wide benefits would be. In order to accomplish these tasks, additional survey work and geotechnical work was authorized to help this study and to reduce uncertainty of cost estimates for the solutions. The unsteady model created by the Corps and modified by adding this subbasin gives a more realistic example of the elevations encountered during large rain events with the natural intermixing of the water from each of these basins.

The Bayou Pattasat basin has an estimate 2000 residences within the basin. From 1995 to 2005 several flooding events have occurred within the Bayou Pattasat basin with an estimated $12,276,666 in damages reported by the City of Slidell. Also on 8/28/2012 Hurricane Isaac caused backwater flooding from Lake Pontchartrain through Bayou Bonfouca into Patassat that caused an additional 129 homes to be flooded and approximate 447 acres of flooding in the basin.

The intent of the City Barn Channel Improvement Project is to increase conveyance in the basin, reduce the propensity for vegetation to clog the bayou, reduce backwater effects from Hurricane Surges and ultimately, reduce flooding within the entire basin. The HEC-RAS unsteady model was performed under existing conditions and four proposed solutions were investigated further for benefits derived.

Existing Conditions – the City of Slidell placed a temporary berm around the City Barn property to prevent hurricane backwater effects from entering into the Pattasat basin as what occurred during Hurricane Isaac in 2012. This change occurred after our original model in this study previously. A model was created to analyze the effects of the basin for the ten, twenty five and one hundred year storm events.

Option #1 – A 200 cfs pump was added to the existing pump station configuration and corresponding water surface elevations were determined for the ten, twenty five, fifty and one hundred year storm events.

Option #2 – Two – 200cfs pumps were added to the existing pump station configuration and corresponding water surface elevations were determined for the ten, twenty five, fifty and one hundred year storm events.

Option#3 – A floodgate with a 400sf opening was added at the pump station and corresponding water surface elevations were determined for the ten, twenty five, fifty and one hundred year storm events.

Option#4 -The 36" lo-lift (67 cfs) pump will be replaced with another 200 cfs pump, and a 5 acre retention pond was constructed, and corresponding water surface elevations were determined for the ten, twenty five, fifty and one hundred year storm events. This was a City requested additional option.

Site Description and History

The project area is located within the old Town of Slidell between Textron and City Barn (a City of Slidell Public Operations facility). Most structures within the entire basin were built prior to the first FEMA Flood Insurance Rate Maps initialized November 16, 1973. These subdivisions include Town of Slidell (1903), Prevost Addition (1907), Dittmar Addition (1927), Robert Addition (1927), Terrace Park (1928), Spanish Trail Highlands (1931), Greenwood Cemetary (prior to 1936), Cousin Addition(before 1936), Park Place (1954), Lincoln Park (1959), and Pine Park Place (1962).

The land use within the drainage basin includes industrial, commercial and residential. The majority of the land is already developed; however some vacant and wooded areas exist within this basin. Performing work on the banks of the bayou near the pump station require coordination with the adjacent landowner, Textron in order to gain access and maintain the sensitive nature and security of its production facility. Also previous storms in the area have highlighted a problem of storm debris collecting in the bends and blocking the flows.

Drainage Basin

The drainage area for the Bayou Pattasat (City Barn) area is 351.7 acres . The area was determined by using LiDAR mapping and Burk & Associates Master Drainage Plan (part of Bayou Bonfouca Drainage Area).

Bayou Pattasat empties into Bayou Bonfouca and runs east upstream under the Norfolk Southern Railroad (approx. 800' upstream), Highway 11 – Front Street (approx. 1000' upstream) – SEGMENT A to a fork at approximately 1870' upstream of Bayou Bonfouca. This area is characterized by commercial and institutional area to the north including a shopping center and Brock Elementary School. South of this Bayou is mainly residential. The Bayou forks to a north reach and a south reach.

The south reach, SEGMENT C, extends approximately 2150 linear feet and has crossings at Carey Street, runs through Greenwood Cemetary and then across Bryan Street, Cleveland Avenue and then 3rd Street (aka Sgt Alfred Drive). The area is comprised of a Cemetary, residential area and a housing complex for the mentally handicapped.

Another reach forks from the southern reach at 3rd Street eastward for approximately 1540 linear feet that runs at the rear of residential homes.

The north reach, SEGMENT B, extends approximately 4000 linear feet and has crossings at Carey Street, 2nd Street, 3rd Street (aka Sgt Alfred Drive), Cousin Street, 6th Street and ends at 10th Street. The area is comprised of a residential area with a wooded buffer along the banks of the Bayou to Cousin Street. North of Cousin Street the Bayou is split by the Courthouse and the Boys and Girls Club and then runs east through a residential area to its terminus just east of 11th Street.

Bayou Pattasat has a very close proximity to the W-14 Drainage Canal in several locations near Park Place Subdivision. There has been a history of flooding within this subdivision. There is a potential for flow between the W-14 Basin and the Bayou Pattasat Basin in this vicinity.

The drainage basin has many repetitive loss structures within the area. These home elevations range from a 4.8 foot to a 6.5 foot elevation. They appear to occur mainly in the old town area as well as the uppermost reaches of the Bayou as shown in figure 2 below.

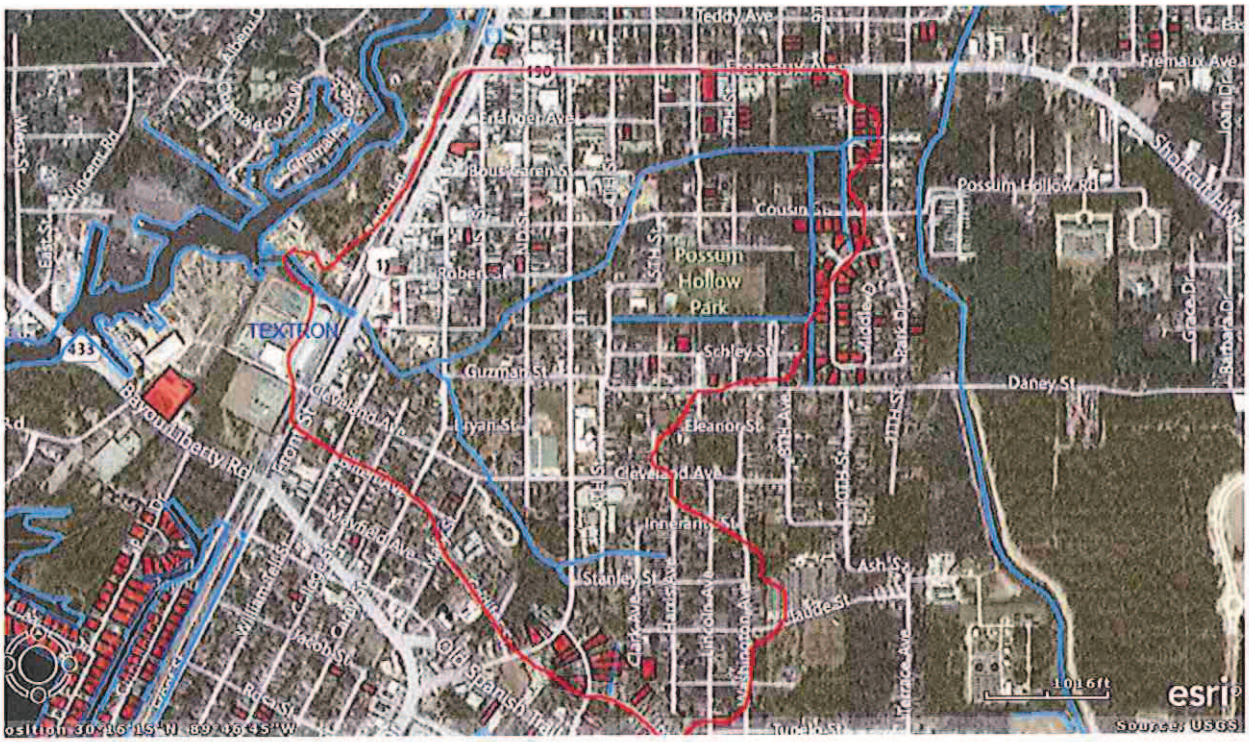

Figure 2. Repetitive Loss Structures in Red

Soils

Additional soil borings were used to look at long term design solutions for the entire basin. These borings included analyzing the possibility of using existing soils at berm around city barn pump station for the permanent berm to existing soils around the existing channels to see about future widening projects if so warranted. Please see appendix A for geotechnical report.

Bayou Pattasat Outfall

Bayou Pattasat's entrance into Bayou Bonfouca is controlled by two outfalls: 1) by gravity through a mechanical gate that can be closed off during tropical storm events, and 2) through its pump station that has three pumps. The existing pump flows are shown below:

Table 1. Existing Pump Flows at City Barn Pumpstation

Description	Flow (gpm)	Flow (cfs)
48" Vertical Axial Flow	60,000 gpm	134 cfs
54"x54" Vertical Axial Flow	90,000 gpm	200 cfs
36" Lolift	30,000 gpm	67 cfs

Hydraulic Calculations (Existing HEC-RAS) – Rain Water Flooding Events

A detailed HEC-RAS unsteady state model was developed within the existing Corps Southeast St. Tammany model. Additional survey work was shot at cross sections and all crossings as shown in Appendix B. Additionally elevations of road intersections were shot across the area to use as a check to the lidar map of the area for coordination of datum information. The water surface elevations ranged approximately from 6.5 feet to 7.5 in the basin for the 10yr to 100yr events, with the current berm in place around the pump station. Also of note there is an approximate 200 cfs spillover from the W-14 into this basin. See appendix C for full results.

Option#1 – Add 200 cfs pump

Since the pumping capacity is approximately 401 cfs and the 100yr flood is approximately 1140 cfs there will be ponding that will be occurring in the basin. By including an additional 200 cfs pump, the water surface elevations lower to 5.8′ to 7.0′ in the basin for the 10yr to 100yr events. See appendix C for full results.

Option#2 – Add 2-200 cfs pumps

Since the pumping capacity is approximately 401 cfs and the 100yr flood is approximately 1140 cfs there will be ponding that will be occurring in the basin. By including an additional 400 cfs pumping capacity, the water surface elevations lower to 4.6′ to 6.6′ in the basin for the 10yr to 100yr events. See appendix C for full results.

Option#3 – Add 400 sf gate opening

Since the pumping capacity is approximately 401 cfs and the 100yr flood is approximately 1140 cfs there will be ponding that will be occurring in the basin. By including an additional 400sf gravity flood gate, the water surface elevations lower to 4.6′ to 6.5′ in the basin for the 10yr to 100yr events. See appendix C for full results.

Option#4 – Replace 67 cfs pump with 200 cfs pump and excavate pond and straighten channel

Since the pumping capacity is approximately 401 cfs and the 100yr flood is approximately 1140 cfs there will be ponding that will be occurring in the basin. By including an additional 133 cfs pumping capacity, and increasing the storage in the basin, the water surface elevations lower to 5.6′ to 7.0 in the basin for the 10yr to 100yr events. See appendix C for full results

Hurricane/Tropical Storm Flooding Events

Currently Bayou Pattasat is unique in that it is a relatively closed system that has two possible entry points from the outside for hurricane backwater events. This updated HEC-RAS unsteady model also

quantified the W-14 side as overflowing into Bayou Pattasat up to approximately 200 cfs (100yr storm) and has modeled this into the numbers. The other avenue for flooding is the Bayou Bonfouca side of the basin.

A future project to consider, not included in this report because of priority, is to reconstruct the berm around the Pump Station in a secure long-term condition. Based upon the Geotechnical condition of the berm material, we would suggest removing the material and replacing with a proper clay material and build the elevation to 11.0 elevation with a 10' crown and a minimum side slopes to meet typical Corps requirements. Transition areas would need to follow the current Corps guidelines. It is anticipated that the construction cost to raise the berm will be approximately $1,084,200.

Existing Conditions/Proposed changes for all options

Currently the section of Bayou Pattasat has a bend immediately before the pumps. Historically this section has been a problem for debris piling up and creating a larger backwater effect for the entire basin as witnessed by Slidell Public Works. Recently the City of Slidell has installed a self-cleaning bar screen at the pump station to help with debris; however the bending of the Bayou needs to be straightened to allow any debris to go to the bar screen for removal. Also during the original study it was noted that there is an existing unsafe condition along southern bank of Bayou Pattasat near the vicinity of an existing parking lot. A sheet pile was recommended to fix this bank and is included in these options. The sheet pile should be installed at an elevation consistent with the berm and railroad elevation.

Cost Estimates

A summary of the construction cost estimates for each solution

Option #1 – $1,447,000

Option #2 – $2,398,600

Option #3- $2,059,800

Option #4 – $2,204,100

Option #4 – Phase 1 – Pump only (no pond) - $1,326,100

Conclusion

During the major storms of 1995-2005 and later Hurricane Isaac in 2012 it was evident that backwater protection is needed in this area. Since the basin has an existing pump station (City Barn Pump Station) and berm around the pump station, the proper analysis was needed to determine the maximum height and the most cost effective solution for the area.

Since the majority of the homes that have historically flooded in this basin are between 4.8 and 9.0' elevation, Option#3 offer the biggest benefit to this area during the normal rainfall flooding (it lowers

the 100yr storm approximately 1-2.5 feet). However this does not offer benefit during a Hurricane stormwater backup. Option#2 would offer the most benefit for both rainfall and storm surge conditions; however the construction cost of $2,398,600 estimate is well above our budget constraints.

We would respectfully suggest increasing pumping capacity within the basin and working towards levee certification around the pumping station. The City of Slidell should be actively involved with St. Tammany Parish in the LAMP process, this area may benefit by lowering flood insurance costs by allowing partial credit.

As a result of trying to get the total project cost around $1.5 million, we would suggest reducing the full scope of Option #4 , remove the Lolift Pump and install a 200cfs pump and do limited straightening of the channel and sheet pile installation. This option could be considered a complete project and then potentially added upon later as funding permits. The anticipated construction cost of this project is $1,326,100, Total A/E Phase of $180,013.38, Supplemental Services $50,000. The project could be bid out with alternates to insure meeting the budget amount.

APPENDIX A

GEOTECHNICAL REPORT

STRATUM ENGINEERING, LLC
Geotechnical Engineering ♦ Testing and Inspection Services

January 17, 2014

J.V. Burkes and Associates
1805 Shortcut Highway
Slidell, Louisiana 70458

Attn: Mr. Sean Burkes, P.E.

Re: Geotechnical Engineering Report
Proposed Soil Characterization
Along Bayou Pattasat
Slidell, Louisiana
SE Project No. G13-098

Dear Sean:

Stratum Engineering, LLC (SE) is pleased to submit our Geotechnical Engineering Report for the above referenced project. The report includes the results of the field and laboratory testing, as well characterization of the soil along Bayou Pattasat.

We appreciate the opportunity to perform this geotechnical study and look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,
STRATUM ENGINEERING, LLC

William "Dean" McInnis, E.I.
Project Manager

Tony Y. Maroun, P.E.
Principal

STATE OF LOUISIANA
TONY Y. MAROUN
License No. 26198
PROFESSIONAL ENGINEER
CIVIL ENGINEERING

WDM/TYM:jkh

GEOTECHNICAL ENGINEERING REPORT

PROPOSED SOIL CHARACTERIZATION
ALONG BAYOU PATTASAT
SLIDELL, LOUISIANA

SE PROJECT NO. G13-098

PREPARED FOR

J.V. BURKES AND ASSOCIATES
1805 SHORTCUT HIGHWAY
SLIDELL, LOUISIANA 70458

JANUARY 17, 2014

BY

STRATUM ENGINEERING, LLC
148 W. HOWZE BEACH ROAD
SLIDELL, LOUISIANA 70458

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PROJECT INFORMATION

Project Authorization

Stratum Engineering, LLC (SE) has completed a geotechnical exploration to characterize the soils in the upper 15 feet along Bayou Pattasat extending from Bayou Bonfouca to near the W-14 Canal in Slidell, Louisiana. The exploration was accomplished in general accordance with SE Proposal G13-147R, dated October 4, 2013 and revised November 22, 2013.

Project Description

The project includes the exploration of the subsurface soil conditions along a portion of Bayou Pattasat. The drainage canal is about 15 to 30 feet wide and 5 to 10 feet deep with steep side slopes caused by erosion. We understand that consideration will be given to widening the Bayou to increase its drainage capacity and improve the flow towards a pump station at Bayou Bonfouca. This will depend on the type of soil in the area and the allowable side slopes which may require land acquisition along its alignment.

Site Description and Location

Bayou Pattasat intersects Bayou Bonfouca adjacent to the City of Slidell facility located at the south end of Bayou Lane. The Bayou extends eastward from Bayou Bonfouca, passing under Front Street (US Highway 11) before running through the Olde Town portion of Slidell. The Bayou splits into two branches just west of Carey Street near Glynn H. Brock Elementary School. The upper branch extends northeast passing through several blocks ending at 10th Street just south of Fremaux Avenue near the W-14 Canal. The lower branch extends south-southeast passing through Greenwood Cemetery before turning more easterly and intersecting Seargent Alfred Drive (3rd Street). The banks on either side of the Bayou are a mixture of open easements which appear to be maintained by the city along with various municipal, residential and commercial properties.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions along the Bayou and evaluate the suitability of the material for future widening and improvements. A total of fifteen (15) borings were drilled to a depth of 6 to 15 feet at accessible locations along the bayou alignment and through a small berm near the floodgate west of US Highway 11. This report outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents general classification of the material encountered along the alignment.

The scope of geotechnical services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

SUBSURFACE CONDITIONS

Field Exploration

The field exploration, which was performed to evaluate the engineering characteristics of the materials along the Bayou, included a reconnaissance of the project site, drilling soil borings and recovering undisturbed and representative disturbed soil samples. Level of groundwater encountered in the test borings, if any, was also measured and recorded.

A total of fifteen (15) borings were drilled to a depth of 6 to 15 feet below the existing ground surface including eleven (11) borings along Bayou Pattasat and four (4) shallow borings along a shallow berm constructed by the City of Slidell from US Highway 11 to the flood gate at Bayou Bonfouca. The boring depth is in reference to the existing ground surface at the time of the field exploration. The borings were located in the field by a Stratum Engineering representative at accessible locations as shown on the boring location plan.

Drilling and Sampling Procedures

The borings were drilled with a truck mounted drill rig. Auger rotary drilling techniques were used to advance most of the boreholes with the exception of four (4) shallow borings which were completed using hand augering techniques. Samples were generally obtained continuously from the ground surface to a depth of fifteen (15) feet. Drilling and sampling techniques were accomplished in general accordance with ASTM Standards.

Undisturbed samples of cohesive soils were generally obtained using thin-wall tube sampling procedures in general accordance with the procedures for "Thin-Walled Tube Geotechnical Sampling of Soils" (ASTM D1587). These samples were extruded in the field with a hydraulic ram, wrapped in aluminum foil and placed in a plastic wrapping. The samples were transported to the laboratory in containers to prevent disturbance.

Representative samples were also secured from the hand augered borings which were obtained at 2 foot intervals or wherever a change in the material was noted. All of the samples were identified according to the project number, boring number and depth, and were also placed in polyethylene plastic wrapping to protect against moisture loss. The samples recovered from the field exploration were identified and evaluated by experienced geotechnical personnel upon arrival at the laboratory.

Laboratory Testing Program

In addition to the field exploration, a supplemental laboratory testing program was conducted to evaluate additional pertinent engineering characteristics of the subsurface materials obtained from the site.

The laboratory testing program included supplementary visual classification and water content tests on all of the soil samples. In addition, selected samples were subjected to percent passing the #200 sieve and Atterberg Limits determination. Additional estimates of undrained shear strength and unconfined compressive strength were made using a torvane and a hand penetrometer, respectively.

The laboratory testing program was conducted in general accordance with applicable ASTM Standard Procedures. The results of these tests can be found on the accompanying boring logs located in the Appendix of this report.

Subsurface Conditions

Based on the borings, approximately 8 to 10 inches of silty topsoil with organics covered the surface. The topsoil was underlain by stiff silty clay with sand extending up to a depth of 4 feet. The silty clay was followed by alternating layers of firm to very stiff light gray lean clay to fat clay with some sand extending to a depth of at least 15 feet, the maximum depth explored. Potential random fill was noted in some of the borings (B-1 and B-10). The fill may extend to a depth of 2 to 8 feet below the surface and as deep as 15 feet at boring B-3.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the Appendix should be reviewed for specific information at the boring locations. These records include soil descriptions, stratification, penetration resistances, and locations of the samples and laboratory test data. The stratification shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratification represents the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on the boring logs. The samples, which were not altered by laboratory testing, will be retained for 60 days from the date of this report and then will be discarded.

Groundwater Information

Groundwater was encountered at a depth of 4 to 13 feet during the drilling operations. It should be noted that the groundwater level will fluctuate with seasonal variations in rainfall, or extended periods of drought and fluctuation of the water level in the Bayou. Perched water may be encountered between the interface of the granular soils and the underlying natural low permeability cohesive soils. Therefore, it is recommended that the actual groundwater level at the site be determined by the contractor at the time of the construction activities.

RECOMMENDATIONS/CONCLUSIONS

The subsurface soils encountered along Bayou Pattasat consist generally of cohesive clays including sandy clays, lean and fat clays. Based on the field data and laboratory test results, the consistency of the clays varied from firm to very stiff with the exception of a couple borings (B-6 and B-11) where sandy silt was encountered between two (2) and six (6) feet.

Furthermore, potential fill was encountered in the upper 2 to 8 feet as depicted on the logs of borings B-1 and B-10 and as deep as 15 feet in boring B-3. The random fill along the Bayou consisted of a mixture of sandy clay with brick fragments. Construction debris was also encountered in boring B-15 along the berm that was constructed by the City of Slidell where the boring refused and was terminated at 6 feet.

Generally, the cohesive soil encountered along most of the Bayou alignment is generally stiff in consistency which could allow grading of the berm side on a 3H:IV slope provided a sufficient distance is maintained from adjacent structures. Such material is generally stable if the material is naturally occurring or placed in a controlled manner. On the other hand, the random fill with brick fragments noted in some of the borings contains unsuitable materials that may become unstable if constructed to the proposed side slope and exposed to flowing water. Therefore, all suspected random fill should be investigated further to verify its composition and determine whether removal and replacement of such materials is necessary. Since stability analysis of the Bayou side slopes is behind the scope of this study, it is recommended that prior to widening the Canal, additional borings be drilled to a sufficient depth to allow proper evaluation of the proposed Bayou side slopes.

Although the fill used to construct the berm west of US Highway 11 consists of lean to fat clay that is generally suitable for berm construction, the clay may have been placed in an uncontrolled manner over a poorly prepared subgrade. In addition, boring B-15 encountered some asphalt fragments indicating that the fill may have been placed on top of some existing pavement or the fill was placed over pavement debris. Therefore, it will be prudent to degrade the berm in the areas in question and reconstruct it in lifts to generally accepted standards.

REPORT LIMITATIONS

The recommendations submitted in this report are based on project information furnished by J.V. Burkes and Associates and the subsurface information obtained by SE. The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

This report has been prepared for the exclusive use of the J.V. Burkes and Associates as related to the classification of the soils along Bayou Pattasat from Bayou Bonfouca to near the W-14 Canal.

APPENDIX

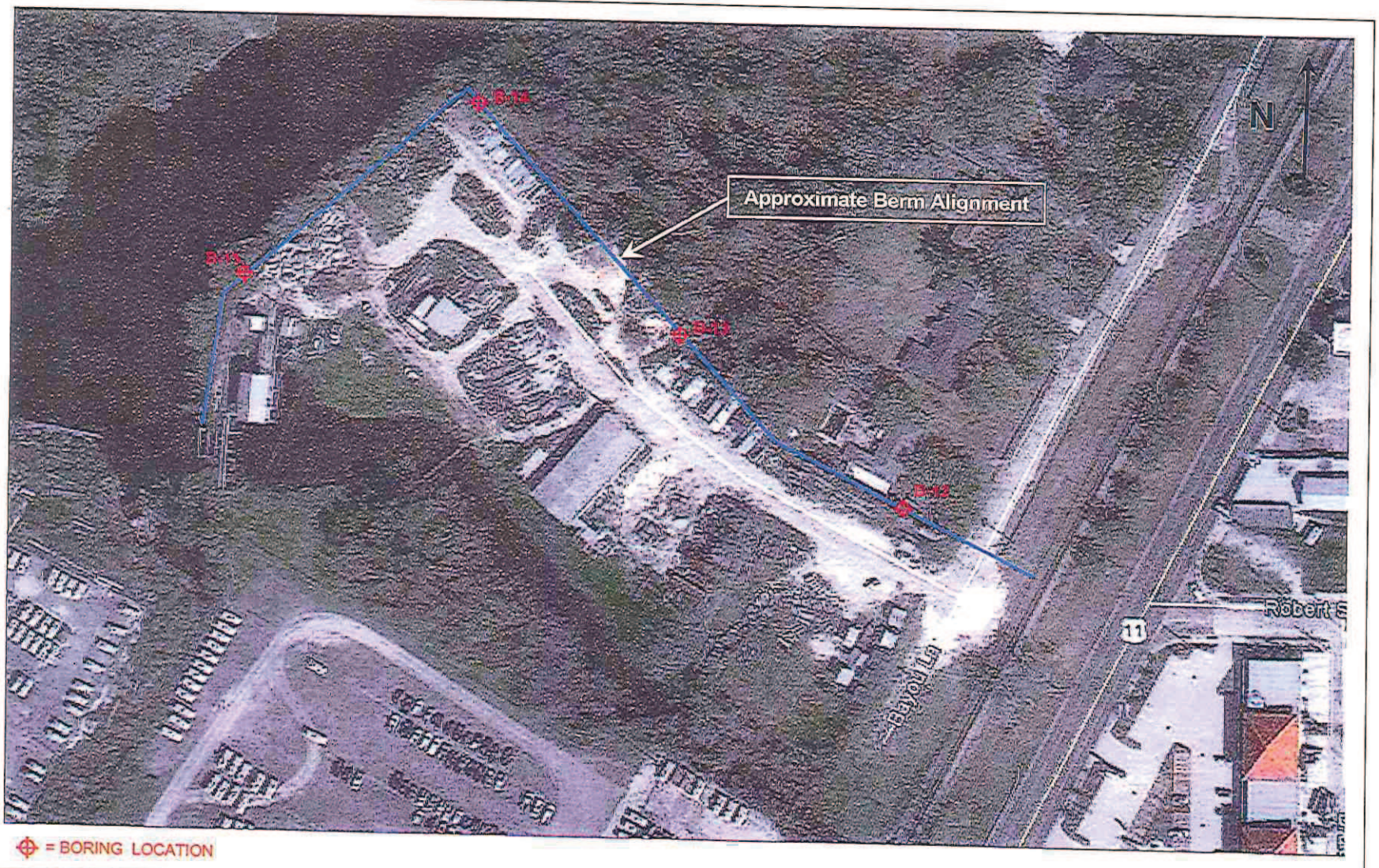
STRATUM
ENGINEERING, LLC

= BORING LOCATION

STRATUM ENGINEERING, LLC

BORING LOCATION PLAN

GEOTECHNICAL ENGINEERING SERVICES
PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA



STRATUM ENGINEERING, LLC

BORING LOCATION PLAN
(HAND AUGER LOCATIONS)

GEOTECHNICAL ENGINEERING SERVICES
PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

STRATUM ENGINEERING, LLC

LOG OF BORING B-1

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: SOUTH END OF BAYOU LANE | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics			3.75			13			
			Very stiff brown and gray Sandy Lean Clay with brick fragments - Potential Fill			3.25			7	26	9	51
5						2.50			15			
			▽			2.50			16			
			Firm dark gray Sandy Silty Clay				0.35		31			66
10												
			- becomes stiff at 13'			1.00			32			
15			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/11/2013

GROUNDWATER: Encountered at 8 Feet During Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-2

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: NORTH END OF WILLIAM TELL STREET | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics Medium dark gray Silty Clayey Sand with organics			1.50			17	21	4	46
			Very stiff tannish gray Lean Clay			4.00			13			
5						3.50			14			
						2.50			17			
10						1.50			15	42	27	
			Very stiff light gray Lean to Fat Clay									
15						2.00			24			
			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/11/2013

GROUNDWATER: Dry Upon Completion of Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-3

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: EAST SIDE OF CAREY STREET AT GUZMAN STREET | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			8" Silty Topsoil with organics			3.25			21			
			Very stiff dark gray Sandy Silty Clay - Fill									
			- with organics and brick fragments, 0' to 2'			1.00			18			
5			Soft to firm black Fat Clay				0.40		31			
			- with organics at 4'									
			- gray with trace of gravel, 6' to 10' - Potential Fill				0.25		43	52	33	84
			- becomes stiff at 8'			1.00			38			
10												
							0.70		52			
15			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/11/2013

GROUNDWATER: Dry Upon Completion of Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-4

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: 1ST STREET ACROSS FROM BRAKEFIELD STREET | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			8" Silty Topsoil with organics			2.50			19			
			Very stiff gray Silty Clay with trace of organics			4.50			16			
5			Very stiff tan and gray Lean Clay			2.50			25	42	22	
						3.50			19			
			- with silt seams, 8' to 15'			3.25			15			
10												
15						4.00			15			
			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/12/2013

GROUNDWATER: Dry Upon Completion of Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-5

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: WEST END OF FAIRBANKS STREET | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics			4.50			15			
			Very stiff tannish gray Lean Clay									
			- stiff at 2' with sand layers			1.25			15			
5						3.50			14			
			Stiff light gray Silty to Lean Clay with large roots			1.50			26			
			Very stiff tannish gray Lean Clay with silt seams			2.75			20			
10												
15						4.50			18			
			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/12/2013

GROUNDWATER: Dry Upon Completion of Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-6

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: ADJACENT TO NORTH SIDE OF 6TH STREET BRIDGE | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics			3.50			12			
			Very stiff brown and gray Silty Clay with sand									
			Dense gray Silt with sand			3.00			14		NP	85
5						4.50			13			
			Very stiff tannish gray Silty Clay with sand			4.50			15			
						4.50			19			85
10												
			▽									
15						3.50			20			
			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/12/2013

GROUNDWATER: Encountered at 13 Feet During Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-7

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: SOUTH END OF 8TH STREET EASEMENT | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics Very stiff tannish gray Silty Clay			4.50			16			
			Very stiff tannish gray Lean Clay			3.00			20	40	24	88
5			- stiff, 4' to 6'			1.50			22			
			- becomes silty clay, 6' to 8'			3.00			15			
10						3.00			17			
15						4.50			16			
			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/12/2013

GROUNDWATER: Dry Upon Completion of Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-8

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: BAYOU INTERSECTION WITH 10TH STREET | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics			4.50			13			
			Stiff to very stiff tannish gray Lean Clay									
			- becomes light gray at 2'			1.00			29			
5						1.00			23			
			Firm tan and gray Lean Clay with sand ▽				0.40		23	29	12	
			- becomes soft at 8'			0.25			24			
10												
15						0.25			23			
			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/12/2013

GROUNDWATER: Encountered at 7 Feet During Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-9

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: EAST SIDE OF CAREY STREET AT BRYAN STREET | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			8" Silty Topsoil with organics Very stiff gray Sandy Silty Clay			3.50			14			
			Very stiff tannish gray Sandy Lean Clay			4.50			10	31	18	70
5						4.50			15			
			- firm, 6' to 8'			0.50			25			
			▽			2.25			16			
10												
15			Very stiff tannish gray Lean to Fat Clay			2.00			28			
			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/11/2013

GROUNDWATER: Encountered at 8 Feet During Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-10

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: NORTH SIDE OF CLEVELAND AVENUE AT MARY STREET | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics			4.50			8			
			Dense gray Sandy Silt with shell and brick fragments									
			Very stiff tannish gray Lean Clay			4.50			12			
5			- silt seams, 2' to 4' ▽			3.50			18			
						2.75			20			
			Very stiff light gray and tan Lean to Fat Clay			4.50			22			
10												
15						4.50			20			
			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/11/2013

GROUNDWATER: Encountered at 4 Feet During Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-11

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: AUGER ROTARY | LOCATION: EASEMENT AT THE SOUTH END OF 2ND STREET | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics Stiff tannish gray Lean Clay with trace of organics			1.50			24	33	13	87
			Dense gray Sandy Silt			3.25			22			
5			Very stiff tannish gray Lean Clay			3.25			21			
						2.25			21			
			▽									
			- stiff with silt seams at 8'			1.50			32			
10												
						2.00			21			
15			Boring Terminated at 15 Feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet
DATE: 12/12/2013

GROUNDWATER: Encountered at 8 Feet During Drilling

STRATUM ENGINEERING, LLC

LOG OF BORING B-12

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: BAYOU LANE BERM | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics Reddish orange Fat Clay with sand						24 26	50	28	80
5			Gray Sandy Silty Clay - with trace of gravel and shells, 4' to 6'						11 14			
			Boring Terminated at 8 Feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 8 Feet
DATE: 12/2/2013

GROUNDWATER: Dry Upon Completion of Augering

STRATUM ENGINEERING, LLC

LOG OF BORING B-13

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: BAYOU LANE BERM | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics Reddish orange Lean Clay with sand						20 24	40	21	84
5			Gray Clayey Sand						17 14			
			Boring Terminated at 8 Feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 8 Feet
DATE: 12/2/2013

GROUNDWATER: Dry Upon Completion of Augering

STRATUM ENGINEERING, LLC

LOG OF BORING B-14

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: BAYOU LANE BERM | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics Reddish orange Lean Clay with sand						17 19	34	15	
5			Gray Silty to Lean Clay						13 14			
			Boring Terminated at 8 Feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 8 Feet
DATE: 12/2/2013

GROUNDWATER: Dry Upon Completion of Augering

STRATUM ENGINEERING, LLC

LOG OF BORING B-15

PROPOSED BAYOU PATTASAT IMPROVEMENTS
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: BAYOU LANE BERM | PROJECT NO.: G13-098

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Topsoil with organics						24			
			Reddish orange Fat Clay with sand and asphalt debris						22			
5									30	55	36	
			Boring Hit Refusal - Terminated at 6'									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 8 Feet
DATE: 12/2/2013

GROUNDWATER: Dry Upon Completion of Augering

KEY TO TERMS AND SYMBOLS USED ON LOGS

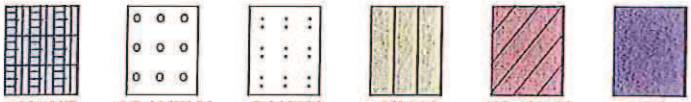
SOIL TYPE

ROCK | GRAVEL | SAND | SILT | CLAY | PEAT

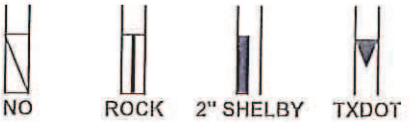
SAMPLER TYPE

NO SAMPLE | AUGER SAMPLE | SHELBY TUBE | SPLIT SPOON

MODIFIERS



STONE | GRAVELY | SANDY | SILTY | CLAYEY | FILL



NO RECOVERY | ROCK CORE | 2" SHELBY TUBE | TXDOT CONE

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

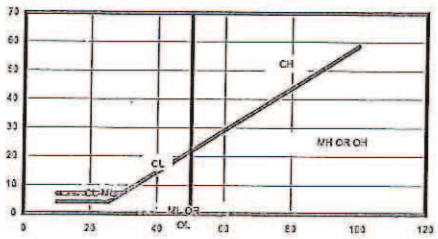
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELLY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES)	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		W/ APPRECIABLE FINES	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN 50% PASSING NO. 4 SIEVE	CLEAN SANDS LITTLE FINES	SW	WELL GRADED SAND, GRAVELLY SAND (LITTLE FINES)
			SP	POORLY GRADED SANDS, GRAVELLY SAND (L.FINES)
		SANDS WITH APPREA. FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS,SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS & VERY FINE SANDS,ROCK FLOUR SILTY OR CLAYEY FINE SANDS OR CLAYEY SILT W/ LOW PI
			CL	INORGANIC CLAY OF LOW TO MEDIUM PI LEAN CLAY GRAVELY CLAYS, SANDY CLAYS, SILTY CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PI
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY FAT CLAYS
			OH	ORGANIC CLAYS OF MED TO HIGH PI, ORGANIC SILT
HIGHLY ORGANIC SOIL			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
UNCLASSIFIED FILL MATERIALS				ARTIFICIALLY DEPOSITED AND OTHER UNCLASSIFIED SOILS AND MAN-MADE SOIL MIXTURES

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	SHEAR STRENGTH IN TONS/FT^2
VERY SOFT	0. TO 0.125
SOFT	0.125 TO 0.25
FIRM	0.25 TO 0.5
STIFF	0.5 TO 1.0
VERY STIFF	1.0 TO 2.0
HARD	> 2.0 OR 2.0+

RELATIVE DENSITY - GRANULAR SOILS

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY LOOSE	0-4
LOOSE	4-9
MEDIUM DENSE	10-29
DENSE	30-49
VERY DENSE	> 50 OR 50+



ABBREVIATIONS

HP - HAND PENETROMETER
TV - TORVANE
MV - MINIATURE VANE
UC - UNCONFINED COMPRESSION TEST
UU - UNCONSOLIDATED UNDRAINED TRAIXIAL
CU - CONSOLIDATED UNDRAINED

NOTE: PLOT INDICATES SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS

▽ DELAYED GROUNDWATER LVL

▽ LEVEL GROUNDWATER ENCOUNTERED

CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

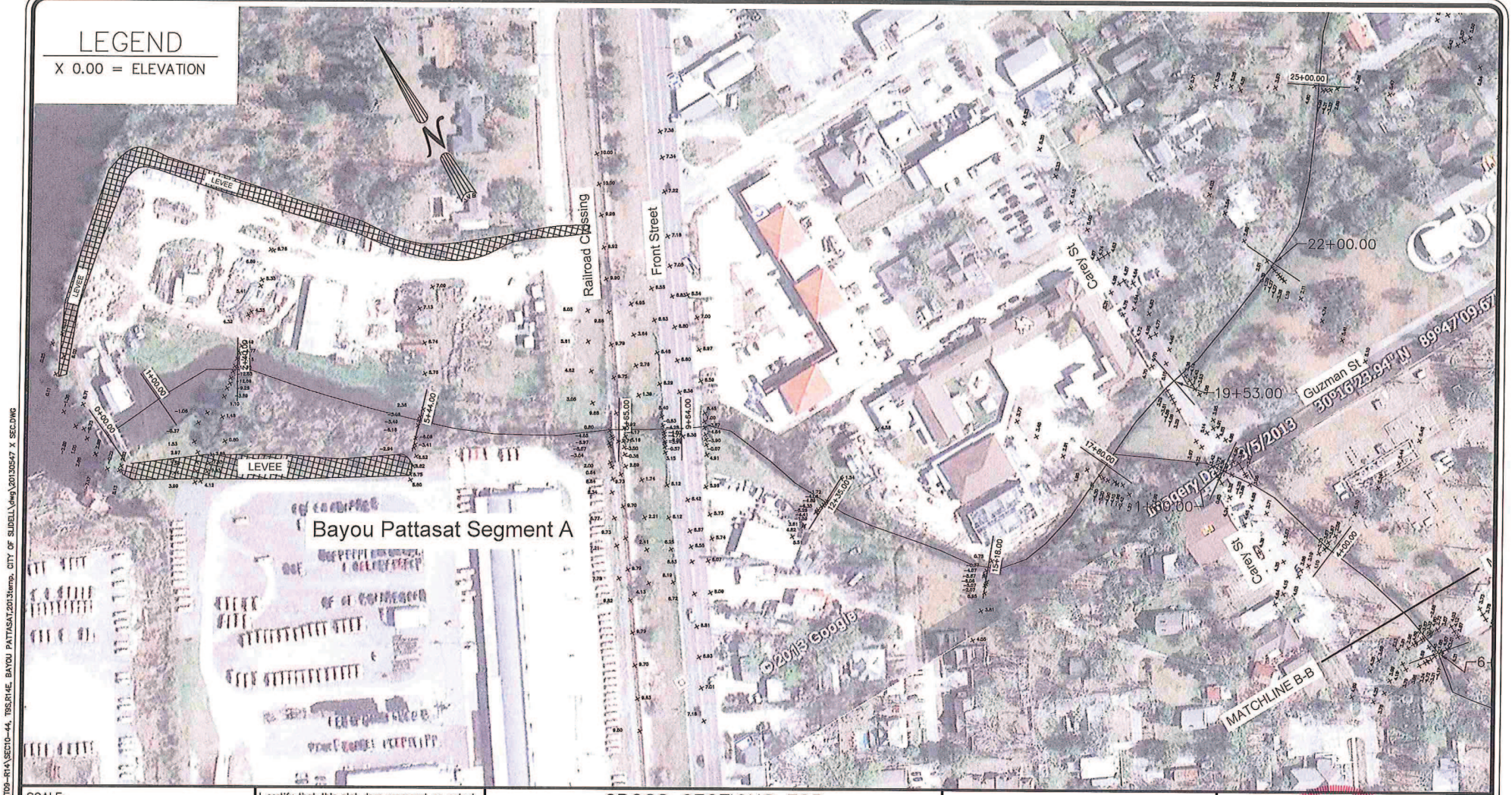
6"	3"	3/4"	4	10	40	200

BOUL--DERS	COBBLES	GRAVEL		SAND			SILT OR CLAY	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
152	76.2	19.1	4.76	2.0	0.42	0.074		0.002

GRAIN SIZE IN MM

APPENDIX B

SURVEY



SCALE:	1" = 150'
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	1 OF 4

I certify that this plat does represent an actual ground survey and that to the best of my knowledge no encroachments exist either way across any of the property lines, except as shown. Encumbrances shown hereon are not necessarily exclusive. Encumbrances of record as shown on title opinion or title policy will be added hereto upon request, as surveyor has not performed any title search or abstract.

CROSS SECTIONS FOR BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

Declaration is made to original purchaser of the survey. It is not transferable to additional institutions or subsequent owners. Survey is valid only if print has original seal of surveyor. Property is not surveyed in accordance with the Louisiana "Minimum Standards for Property Boundary Surveys." Bearings are based on record bearings unless noted otherwise.

CITY OF SLIDELL

J.V. Burkes & Associates, Inc.
SURVEYING ENGINEERING ● ENVIRONMENTAL
1805 HWY. 190 EAST
Slidell, Louisiana 70458
E-mail: jvbassoc@jvburkes.com
Phone: 985-649-0075 Fax: 985-649-0154
Mississippi Phone: 228-435-5800

STATE OF LOUISIANA
SEAN M. BURKES
REG No. 4785
REGISTERED
LAND SURVEYOR

SEAN M. BURKES
LA REG. NO. 4785

M:\SURVEYING\2013\BOUNDARY SURVEY\T09-R14\SEC10-44, T9S,R14E, BAYOU PATTASAT,2013dwg, CITY OF SLIDELL\dwg\20130547 X SEC.DWG

M:\SURVEYING\2013\BOUNDARY SURVEY\T09-R14\SEC10-44, T9S,R14E, BAYOU PATTASAT,2013temp. CITY OF SLIDELL\dwg\20130547 X SEC.DWG

SCALE:	1" = 150'
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	2 OF 4

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CROSS SECTIONS FOR BAYOU PATTASAT T9S – R14E, SECTION 10 & 44 CITY OF SLIDELL ST. TAMMANY PARISH, LOUISIANA

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Slidell, Louisiana 70458
E-mail: jvbassoc@jvburkes.com
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SEAN M. BURKES
REG No. 4785
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LAND SURVEYOR

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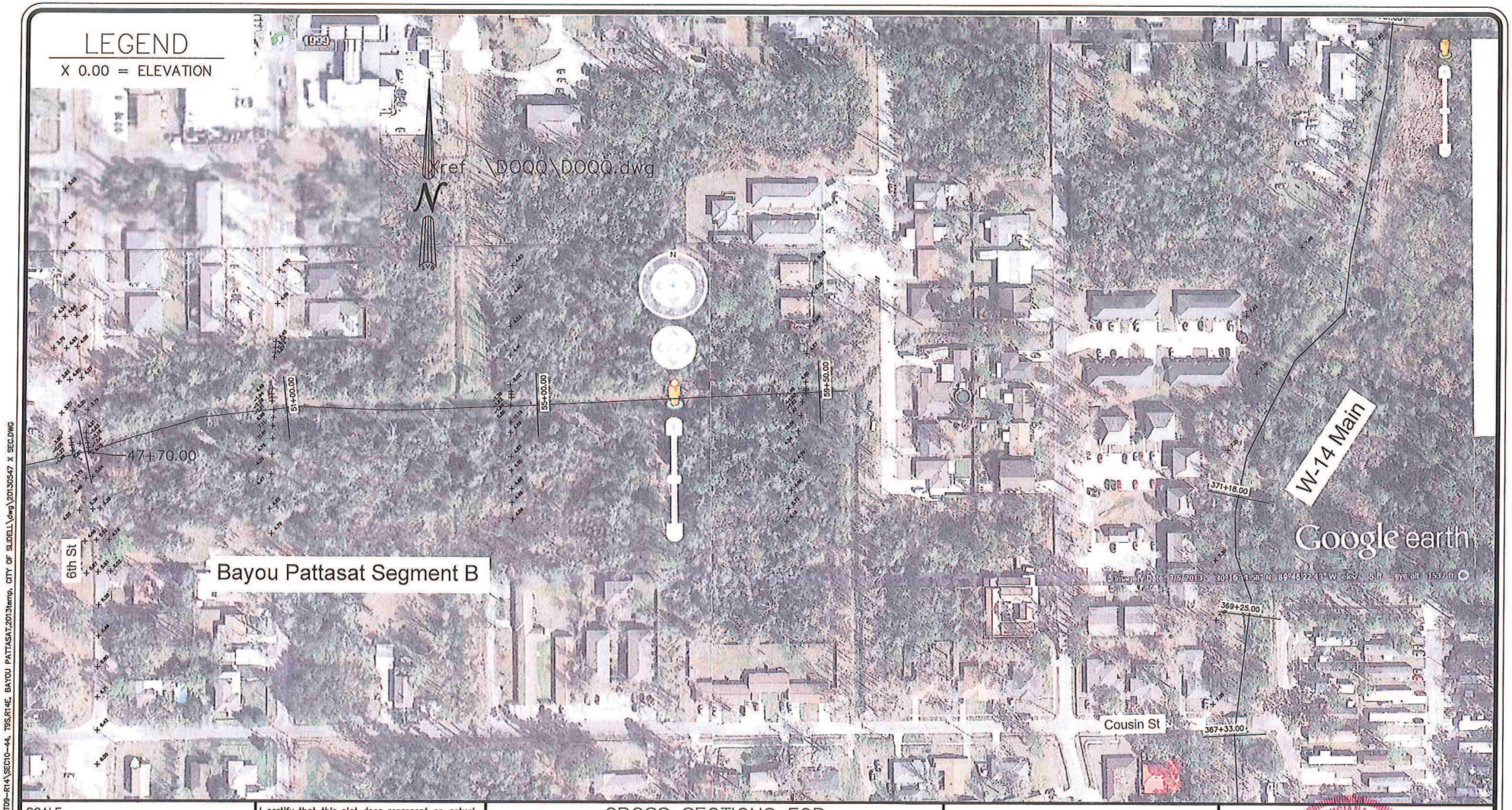

SCALE:	1" = 150'
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	3 OF 4

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CROSS SECTIONS FOR BAYOU PATTASAT T9S – R14E, SECTION 10 & 44 CITY OF SLIDELL ST. TAMMANY PARISH, LOUISIANA

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STATE OF LOUISIANA
SEAN M. BURKES
REG No. 4785
REGISTERED
LAND SURVEYOR

SEAN M. BURKES
LA REG. NO. 4785

M:\SURVEYING\2013\BOUNDARY SURVEY\T09-R14\SEC10-44, T9S,R14E, BAYOU PATTASAT.2013temp. CITY OF SLIDELL\dwg\201305427 X SEC.DWG

SCALE:	1" = 150'
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	4 OF 4

I certify that this plat does represent an actual ground survey and that to the best of my knowledge no encroachments exist either way across any of the property lines, except as shown. Encumbrances shown hereon are not necessarily exclusive. Encumbrances of record as shown on title opinion or title policy will be added hereto upon request, as surveyor has not performed any title search or abstract.

CROSS SECTIONS FOR BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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SEAN M. BURKES
LA REG. NO. 4785

M:\SURVEYING\2013\BOUNDARY SURVEY\T09-R14\SEC10-44, T9S,R14E, BAYOU PATTASAT 2013temp, CITY OF SLIDELL\dwg\20130547 X SEC.DWG

APPENDIX C

HYDRAULIC ANALYSIS

			ECM		Option#1	Option#1	Option#2	Option#2	Option#3	Option#3	Option#4	Option#4	Phase 1	Phase 1
Flood gate Opening			Closed		Closed	Elev.	Closed	Elev.	Open (4' x 100')	Elev.	Closed	Elev.	Closed	Elev.
Pump Capacity			401 cfs		601 cfs	Change	801 cfs	Change	401 cfs	Change	534 cfs	Change	534 cfs	Change
W14 Levee			No		No	from	No	from	No	from	No	from	No	from
Sump Basin			No		No	Existing	No	Existing	No	Existing	Yes (5 acres)	Existing	No	Existing
			10 Year Water Surface Elevations (ft)											
RS	Reach	Location Description												
0	A	Starting WSEL - Con Bonfouca	3.00		3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00
40	A	10' US Pump Station	6.15		5.59	-0.56	4.22	-1.93	4.45	-1.70	5.62	-0.53	5.77	-0.38
544	A	500' US Pump Station	6.15		5.59	-0.56	4.22	-1.93	4.45	-1.70	5.62	-0.53	5.77	-0.38
847	A	DS Face of Railroad Crossing	6.15		5.60	-0.55	4.25	-1.90	4.49	-1.66	5.63	-0.52	5.78	-0.37
883	A	US Face of Railroad Crossing	6.16		5.61	-0.55	4.30	-1.86	4.54	-1.62	5.64	-0.52	5.78	-0.38
924	A	DS Face of Front St	6.16		5.61	-0.55	4.30	-1.86	4.54	-1.62	5.63	-0.53	5.78	-0.38
1004	A	US Face of Front St	6.17		5.63	-0.54	4.79	-1.38	5.03	-1.14	5.66	-0.51	5.81	-0.36
1780	A	Con with Seg B and C	6.20		5.70	-0.50	4.98	-1.22	5.22	-0.98	5.71	-0.49	5.86	-0.34
1927	B	DS Face of Carey St	6.20		5.71	-0.49	4.98	-1.22	5.23	-0.97	5.72	-0.48	5.86	-0.34
1979	B	US Face of Carey St	6.20		5.73	-0.47	5.12	-1.08	5.28	-0.92	5.74	-0.46	5.88	-0.32
2772	B	DS Face of 2nd St	6.21		5.77	-0.44	5.20	-1.01	5.38	-0.83	5.77	-0.44	5.90	-0.31
2828	B	US Face of 2nd St	6.22		5.79	-0.43	5.27	-0.95	5.45	-0.77	5.78	-0.44	5.92	-0.30
3167	B	DS Face of 3rd St	6.22		5.81	-0.41	5.33	-0.89	5.53	-0.69	5.80	-0.42	5.93	-0.29
3233	B	US Face of 3rd St	6.23		5.83	-0.40	5.37	-0.86	5.57	-0.66	5.81	-0.42	5.94	-0.29
3858	B	DS Face of Cousin St	6.23		5.85	-0.38	5.44	-0.79	5.63	-0.60	5.83	-0.40	5.95	-0.28
3912	B	US Face of Cousin St	6.24		5.86	-0.38	5.47	-0.77	5.66	-0.58	5.84	-0.40	5.96	-0.28
4748	B	DS Face of 6th St	6.25		5.90	-0.35	5.57	-0.68	5.74	-0.51	5.87	-0.38	5.99	-0.26
4792	B	US Face of 6th St	6.25		5.92	-0.33	5.74	-0.51	5.80	-0.45	5.90	-0.35	6.00	-0.25
5950	B	US Limit	6.26		5.96	-0.30	5.83	-0.43	5.88	-0.38	5.93	-0.33	6.03	-0.23
153	C	DS Face of Carey St	6.20		5.71	-0.49	4.99	-1.21	5.24	-0.96	5.72	-0.48	5.86	-0.34
207	C	US Face of Carey St	6.21		5.74	-0.47	5.10	-1.11	5.30	-0.91	5.74	-0.47	5.88	-0.33
610	C	DS Face of Bryan St	6.21		5.76	-0.45	5.17	-1.04	5.37	-0.84	5.76	-0.45	5.90	-0.31
664	C	US Face of Bryan St	6.22		5.77	-0.45	5.20	-1.02	5.40	-0.82	5.76	-0.46	5.90	-0.32
1115	C	DS Face of Cleveland Ave	6.22		5.77	-0.45	5.23	-0.99	5.52	-0.70	5.77	-0.45	5.91	-0.31
1165	C	US Face of Cleveland Ave	6.22		5.77	-0.45	5.23	-0.99	5.42	-0.80	5.77	-0.45	5.91	-0.31
2100	C	US Limit	6.22		5.79	-0.43	5.28	-0.94	5.47	-0.75	5.78	-0.44	5.82	-0.40
36680	W14	DS Levee	6.62		6.62	0.00	6.62	0.00	6.62	0.00	6.62	0.00	6.62	0.00

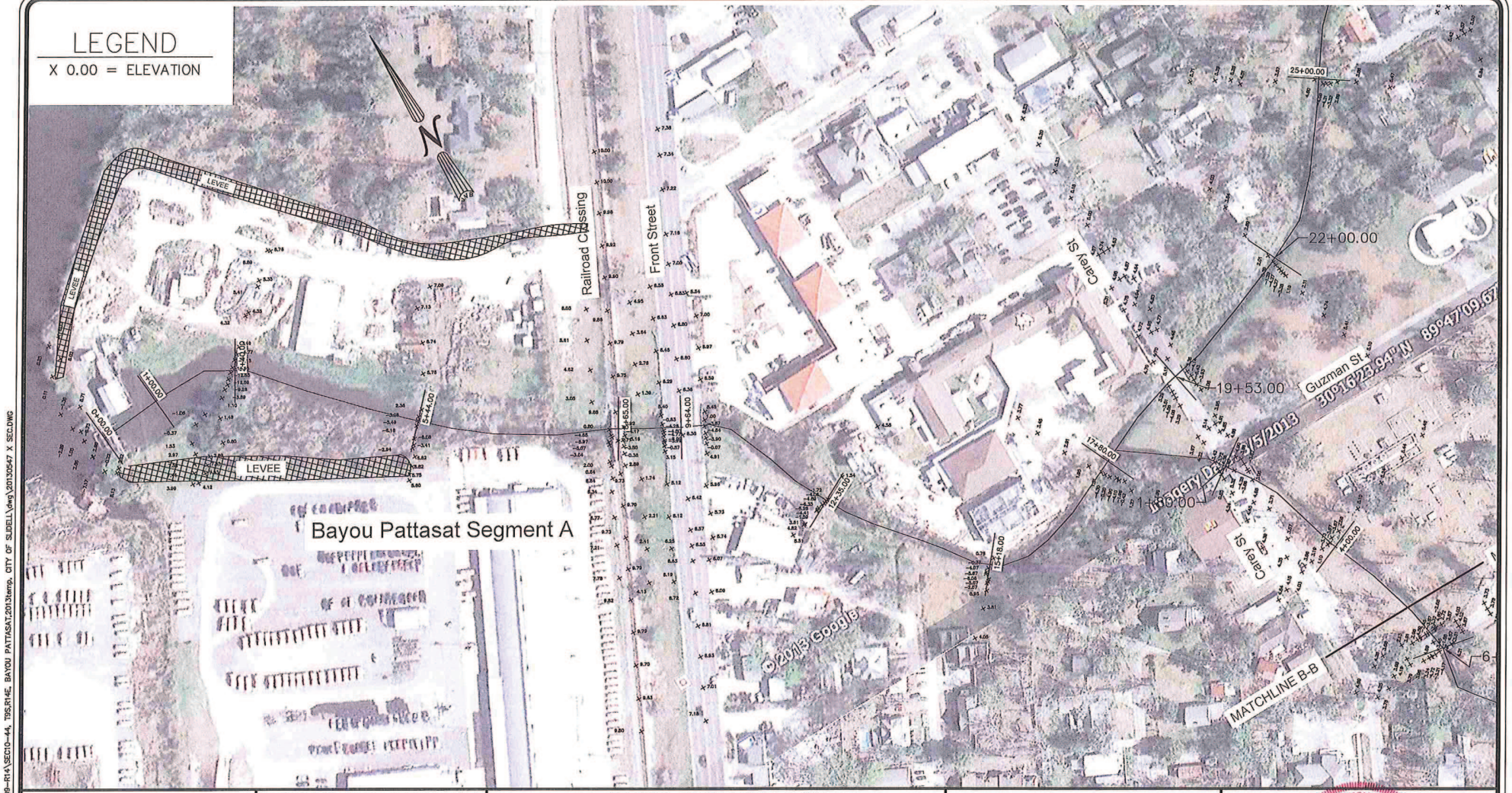
			ECM	Option#1	Option#1	Option#2	Option#2	Option#3	Option#3	Option#4	Option#4	Phase 1	Phase 1
Flood gate Opening			Closed	Closed	Elev.	Closed	Elev.	Open (4' x 100')	Elev.	Closed	Elev.	Closed	Elev.
Pump Capacity			401 cfs	601 cfs	Change	801 cfs	Change	401 cfs	Change	534 cfs	Change	534 cfs	Change
W14 Levee			No	No	from	No	from	No	from	No	from	No	from
Sump Basin			No	No	Existing	No	Existing	No	Existing	Yes (5 acres)	Existing	No	Existing
			25 Year Water Surface Elevations (ft)										
RS	Reach	Location Description											
0	A	Starting WSEL - Con Bonfouca	3.00	3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00
40	A	10' US Pump Station	6.66	6.04	-0.62	5.20	-1.46	4.68	-1.98	6.13	-0.53	6.23	-0.43
544	A	500' US Pump Station	6.66	6.04	-0.62	5.20	-1.46	4.69	-1.97	6.13	-0.53	6.23	-0.43
847	A	DS Face of Railroad Crossing	6.66	6.05	-0.61	5.22	-1.44	4.72	-1.94	6.13	-0.53	6.23	-0.43
883	A	US Face of Railroad Crossing	6.67	6.06	-0.61	5.24	-1.43	4.78	-1.89	6.14	-0.53	6.24	-0.43
924	A	DS Face of Front St	6.67	6.06	-0.61	5.24	-1.43	4.78	-1.89	6.14	-0.53	6.24	-0.43
1004	A	US Face of Front St	6.68	6.09	-0.59	5.28	-1.40	5.20	-1.48	6.17	-0.51	6.27	-0.41
1780	A	Con with Seg B and C	6.70	6.15	-0.55	5.43	-1.27	5.43	-1.27	6.21	-0.49	6.31	-0.39
1927	B	DS Face of Carey St	6.70	6.15	-0.55	5.44	-1.26	5.44	-1.26	6.21	-0.49	6.31	-0.39
1979	B	US Face of Carey St	6.70	6.16	-0.54	5.69	-1.01	5.48	-1.22	6.22	-0.48	6.32	-0.38
2772	B	DS Face of 2nd St	6.71	6.18	-0.53	5.75	-0.96	5.60	-1.11	6.24	-0.47	6.33	-0.38
2828	B	US Face of 2nd St	6.71	6.19	-0.52	5.78	-0.93	5.67	-1.04	6.25	-0.46	6.34	-0.37
3167	B	DS Face of 3rd St	6.71	6.20	-0.51	5.87	-0.84	5.74	-0.97	6.26	-0.45	6.35	-0.36
3233	B	US Face of 3rd St	6.71	6.21	-0.50	5.83	-0.88	5.77	-0.94	6.26	-0.45	6.35	-0.36
3858	B	DS Face of Cousin St	6.72	6.23	-0.49	5.86	-0.86	5.84	-0.88	6.27	-0.45	6.36	-0.36
3912	B	US Face of Cousin St	6.72	6.23	-0.49	5.88	-0.84	5.86	-0.86	6.28	-0.44	6.36	-0.36
4748	B	DS Face of 6th St	6.72	6.25	-0.47	5.93	-0.79	5.95	-0.77	6.29	-0.43	6.38	-0.34
4792	B	US Face of 6th St	6.73	6.25	-0.48	5.97	-0.76	6.00	-0.73	6.30	-0.43	6.39	-0.34
5950	B	US Limit	6.73	6.29	-0.44	6.02	-0.71	6.08	-0.65	6.32	-0.41	6.40	-0.33
153	C	DS Face of Carey St	6.70	6.15	-0.55	5.44	-1.26	5.45	-1.25	6.21	-0.49	6.31	-0.39
207	C	US Face of Carey St	6.70	6.17	-0.53	5.50	-1.20	5.75	-0.95	6.23	-0.47	6.32	-0.38
610	C	DS Face of Bryan St	6.71	6.18	-0.53	5.55	-1.16	5.80	-0.91	6.24	-0.47	6.33	-0.38
664	C	US Face of Bryan St	6.71	6.19	-0.52	5.57	-1.14	5.82	-0.89	6.24	-0.47	6.34	-0.37
1115	C	DS Face of Cleveland Ave	6.71	6.19	-0.52	5.58	-1.13	5.84	-0.87	6.25	-0.46	6.34	-0.37
1165	C	US Face of Cleveland Ave	6.71	6.19	-0.52	5.58	-1.13	5.84	-0.87	6.25	-0.46	6.34	-0.37
2100	C	US Limit	6.71	6.20	-0.51	5.62	-1.09	5.87	-0.84	6.25	-0.46	6.35	-0.36
36680	W14	DS Levee	6.70	6.70	0.00	6.70	0.00	6.70	0.00	6.70	0.00	6.70	0.00

			ECM		Option#1	Option#1	Option#2	Option#2	Option#3	Option#3	Option#4	Option#4	Phase 1	Phase 1
Flood gate Opening			Closed		Closed	Elev.	Closed	Elev.	Open (4' x 100')	Elev.	Closed	Elev.	Closed	Elev.
Pump Capacity			401 cfs		601 cfs	Change	801 cfs	Change	401 cfs	Change	534 cfs	Change	534 cfs	Change
W14 Levee			No		No	from	No	from	No	from	No	from	No	from
Sump Basin			No		No	Existing	No	Existing	No	Existing	Yes (5 acres)	Existing	No	Existing
			50 Year Water Surface Elevations (ft)											
RS	Reach	Location Description												
0	A	Starting WSEL - Con Bonfouca	3.00		3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00
40	A	10' US Pump Station	6.91		6.28	-0.63	5.51	-1.40	4.86	-2.05	6.37	-0.54	6.48	-0.43
544	A	500' US Pump Station	6.91		6.28	-0.63	5.51	-1.40	4.86	-2.05	6.37	-0.54	6.48	-0.43
847	A	DS Face of Railroad Crossing	6.91		6.28	-0.63	5.52	-1.39	4.91	-2.00	6.37	-0.54	6.48	-0.43
883	A	US Face of Railroad Crossing	6.91		6.29	-0.62	5.54	-1.37	4.96	-1.95	6.38	-0.53	6.49	-0.42
924	A	DS Face of Front St	6.91		6.29	-0.62	5.53	-1.38	4.96	-1.95	6.38	-0.53	6.49	-0.42
1004	A	US Face of Front St	6.93		6.33	-0.60	5.59	-1.34	5.21	-1.72	6.41	-0.52	6.52	-0.41
1780	A	Con with Seg B and C	6.94		6.38	-0.56	5.72	-1.22	5.50	-1.44	6.44	-0.50	6.55	-0.39
1927	B	DS Face of Carey St	6.95		6.38	-0.57	5.72	-1.23	5.50	-1.45	6.45	-0.50	6.55	-0.40
1979	B	US Face of Carey St	6.95		6.39	-0.56	5.94	-1.01	5.59	-1.36	6.45	-0.50	6.56	-0.39
2772	B	DS Face of 2nd St	6.95		6.41	-0.54	5.99	-0.96	5.71	-1.24	6.46	-0.49	6.57	-0.38
2828	B	US Face of 2nd St	6.95		6.41	-0.54	6.01	-0.94	5.78	-1.17	6.47	-0.48	6.57	-0.38
3167	B	DS Face of 3rd St	6.95		6.42	-0.53	6.03	-0.92	5.85	-1.10	6.48	-0.47	6.58	-0.37
3233	B	US Face of 3rd St	6.96		6.43	-0.53	6.04	-0.92	5.88	-1.08	6.48	-0.48	6.58	-0.38
3858	B	DS Face of Cousin St	6.96		6.44	-0.52	6.07	-0.89	5.94	-1.02	6.49	-0.47	6.59	-0.37
3912	B	US Face of Cousin St	6.96		6.44	-0.52	6.08	-0.88	6.01	-0.95	6.49	-0.47	6.59	-0.37
4748	B	DS Face of 6th St	6.96		6.46	-0.50	6.12	-0.84	6.09	-0.87	6.51	-0.45	6.61	-0.35
4792	B	US Face of 6th St	6.97		6.47	-0.50	6.14	-0.83	6.13	-0.84	6.51	-0.46	6.61	-0.36
5950	B	US Limit	6.97		6.48	-0.49	6.18	-0.79	6.20	-0.77	6.52	-0.45	6.62	-0.35
153	C	DS Face of Carey St	6.95		6.38	-0.57	5.73	-1.22	5.51	-1.44	6.45	-0.50	6.55	-0.40
207	C	US Face of Carey St	6.95		6.40	-0.55	5.79	-1.16	5.60	-1.35	6.46	-0.49	6.56	-0.39
610	C	DS Face of Bryan St	6.95		6.41	-0.54	5.83	-1.12	5.68	-1.27	6.47	-0.48	6.57	-0.38
664	C	US Face of Bryan St	6.95		6.42	-0.53	5.85	-1.10	5.86	-1.09	6.47	-0.48	6.58	-0.37
1115	C	DS Face of Cleveland Ave	6.95		6.42	-0.53	5.86	-1.09	5.89	-1.06	6.47	-0.48	6.58	-0.37
1165	C	US Face of Cleveland Ave	6.96		6.42	-0.54	5.86	-1.10	5.89	-1.07	6.47	-0.49	6.58	-0.38
2100	C	US Limit	6.96		6.42	-0.54	5.89	-1.07	5.92	-1.04	6.48	-0.48	6.58	-0.38
36680	W14	DS Levee	6.70		6.70	0.00	6.70	0.00	6.70	0.00	6.70	0.00	6.70	0.00

			ECM	Option#1	Option#1	Option#2	Option#2	Option#3	Option#3	Option#4	Option#4	Phase 1	Phase 1
Flood gate Opening			Closed	Closed	Elev.	Closed	Elev.	Open (4' x 100')	Elev.	Closed	Elev.	Closed	Elev.
Pump Capacity			401 cfs	601 cfs	Change	801 cfs	Change	401 cfs	Change	534 cfs	Change	534 cfs	Change
W14 Levee			No	No	from	No	from	No	from	No	from	No	from
Sump Basin			No	No	Existing	No	Existing	No	Existing	Yes (5 acres)	Existing	No	Existing
			100 Year Water Surface Elevations (ft)										
RS	Reach	Location Description											
0	A	Starting WSEL - Con Bonfouca	3.00	3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00	3.00	0.00
40	A	10' US Pump Station	7.33	6.71	-0.62	6.08	-1.25	4.91	-2.42	6.82	-0.51	6.94	-0.39
544	A	500' US Pump Station	7.33	6.71	-0.62	6.08	-1.25	4.92	-2.41	6.81	-0.52	6.94	-0.39
847	A	DS Face of Railroad Crossing	7.33	6.71	-0.62	6.09	-1.24	4.96	-2.37	6.82	-0.51	6.94	-0.39
883	A	US Face of Railroad Crossing	7.34	6.72	-0.62	6.11	-1.23	5.01	-2.33	6.83	-0.51	6.95	-0.39
924	A	DS Face of Front St	7.34	6.72	-0.62	6.11	-1.23	5.01	-2.33	6.83	-0.51	6.95	-0.39
1004	A	US Face of Front St	7.35	6.75	-0.60	6.17	-1.18	5.23	-2.12	6.85	-0.50	6.97	-0.38
1780	A	Con with Seg B and C	7.36	6.78	-0.58	6.26	-1.10	5.51	-1.85	6.88	-0.48	7.00	-0.36
1927	B	DS Face of Carey St	7.36	6.78	-0.58	6.27	-1.09	5.53	-1.83	6.88	-0.48	7.00	-0.36
1979	B	US Face of Carey St	7.36	6.79	-0.57	6.35	-1.01	5.80	-1.56	6.88	-0.48	7.00	-0.36
2772	B	DS Face of 2nd St	7.36	6.80	-0.56	6.38	-0.98	5.90	-1.46	6.89	-0.47	7.01	-0.35
2828	B	US Face of 2nd St	7.36	6.80	-0.56	6.39	-0.97	5.95	-1.41	6.89	-0.47	7.01	-0.35
3167	B	DS Face of 3rd St	7.37	6.81	-0.56	6.40	-0.97	6.00	-1.37	6.89	-0.48	7.01	-0.36
3233	B	US Face of 3rd St	7.37	6.81	-0.56	6.41	-0.96	6.03	-1.34	6.90	-0.47	7.01	-0.36
3858	B	DS Face of Cousin St	7.37	6.82	-0.55	6.43	-0.94	6.08	-1.29	6.90	-0.47	7.02	-0.35
3912	B	US Face of Cousin St	7.37	6.82	-0.55	6.43	-0.94	6.38	-0.99	6.95	-0.42	7.02	-0.35
4748	B	DS Face of 6th St	7.37	6.83	-0.54	6.46	-0.91	6.44	-0.93	6.97	-0.40	7.03	-0.34
4792	B	US Face of 6th St	7.56	6.84	-0.72	6.47	-1.09	6.45	-1.11	6.97	-0.59	7.03	-0.53
5950	B	US Limit	7.58	6.85	-0.73	6.49	-1.09	6.50	-1.08	7.01	-0.57	7.04	-0.54
153	C	DS Face of Carey St	7.36	6.78	-0.58	6.27	-1.09	5.54	-1.82	6.88	-0.48	7.00	-0.36
207	C	US Face of Carey St	7.37	6.79	-0.58	6.31	-1.06	5.64	-1.73	6.88	-0.49	7.00	-0.37
610	C	DS Face of Bryan St	7.37	6.80	-0.57	6.33	-1.04	5.72	-1.65	6.89	-0.48	7.01	-0.36
664	C	US Face of Bryan St	7.37	6.81	-0.56	6.34	-1.03	6.32	-1.05	6.89	-0.48	7.01	-0.36
1115	C	DS Face of Cleveland Ave	7.37	6.81	-0.56	6.35	-1.02	6.34	-1.03	6.89	-0.48	7.01	-0.36
1165	C	US Face of Cleveland Ave	7.37	6.81	-0.56	6.35	-1.02	6.34	-1.03	6.89	-0.48	7.01	-0.36
2100	C	US Limit	7.37	6.81	-0.56	6.36	-1.01	6.36	-1.01	6.90	-0.47	7.02	-0.35
36680	W14	DS Levee	6.83	6.83	0.00	6.83	0.00	6.83	0.00	6.83	0.00	6.83	0.00

C-1

EXISTING CONDITIONS (ECM)



SCALE:	1" = 150'
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	1 OF 4

I certify that this plat does represent an actual ground survey and that to the best of my knowledge no encroachments exist either way across any of the property lines, except as shown. Encumbrances shown hereon are not necessarily exclusive. Encumbrances of record as shown on title opinion or title policy will be added hereto upon request, as surveyor has not performed any title search or abstract.

CROSS SECTIONS FOR BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

Declaration is made to original purchaser of the survey. It is not transferable to additional institutions or subsequent owners. Survey is valid only if print has original seal of surveyor. Property is not surveyed in accordance with the Louisiana "Minimum Standards for Property Boundary Surveys." Bearings are based on record bearings unless noted otherwise.

CITY OF SLIDELL

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STATE OF LOUISIANA
SEAN M. BURKES
REG No. 4785
REGISTERED
LAND SURVEYOR

SEAN M. BURKES
LA REG. NO. 4785

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SCALE:	1" = 150'
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	2 OF 4

I certify that this plat does represent an actual ground survey and that to the best of my knowledge no encroachments exist either way across any of the property lines, except as shown. Encumbrances shown hereon are not necessarily exclusive. Encumbrances of record as shown on title opinion or title policy will be added hereto upon request, as surveyor has not performed any title search or abstract.

CROSS SECTIONS FOR BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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CITY OF SLIDELL

J.V. Burkes & Associates, Inc.
SURVEYING ENGINEERING ● ENVIRONMENTAL
1805 HWY. 190 EAST
Slidell, Louisiana 70458
E-mail: jvbassoc@jvburkes.com
Phone: 985-649-0075 Fax: 985-649-0154
Mississippi Phone: 228-435-5800

STATE OF LOUISIANA
SEAN M. BURKES
REG No. 4785
REGISTERED
LAND SURVEYOR

SEAN M. BURKES
LA REG. NO. 4785

SCALE:	1" = 150'
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	3 OF 4

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T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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STATE OF LOUISIANA
SEAN M. BURKES
REG. No. 4785
REGISTERED
LAND SURVEYOR

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LA REG. NO. 4785

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SCALE:	1" = 150'
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	4 OF 4

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CROSS SECTIONS FOR BAYOU PATTASAT T9S – R14E, SECTION 10 & 44 CITY OF SLIDELL ST. TAMMANY PARISH, LOUISIANA

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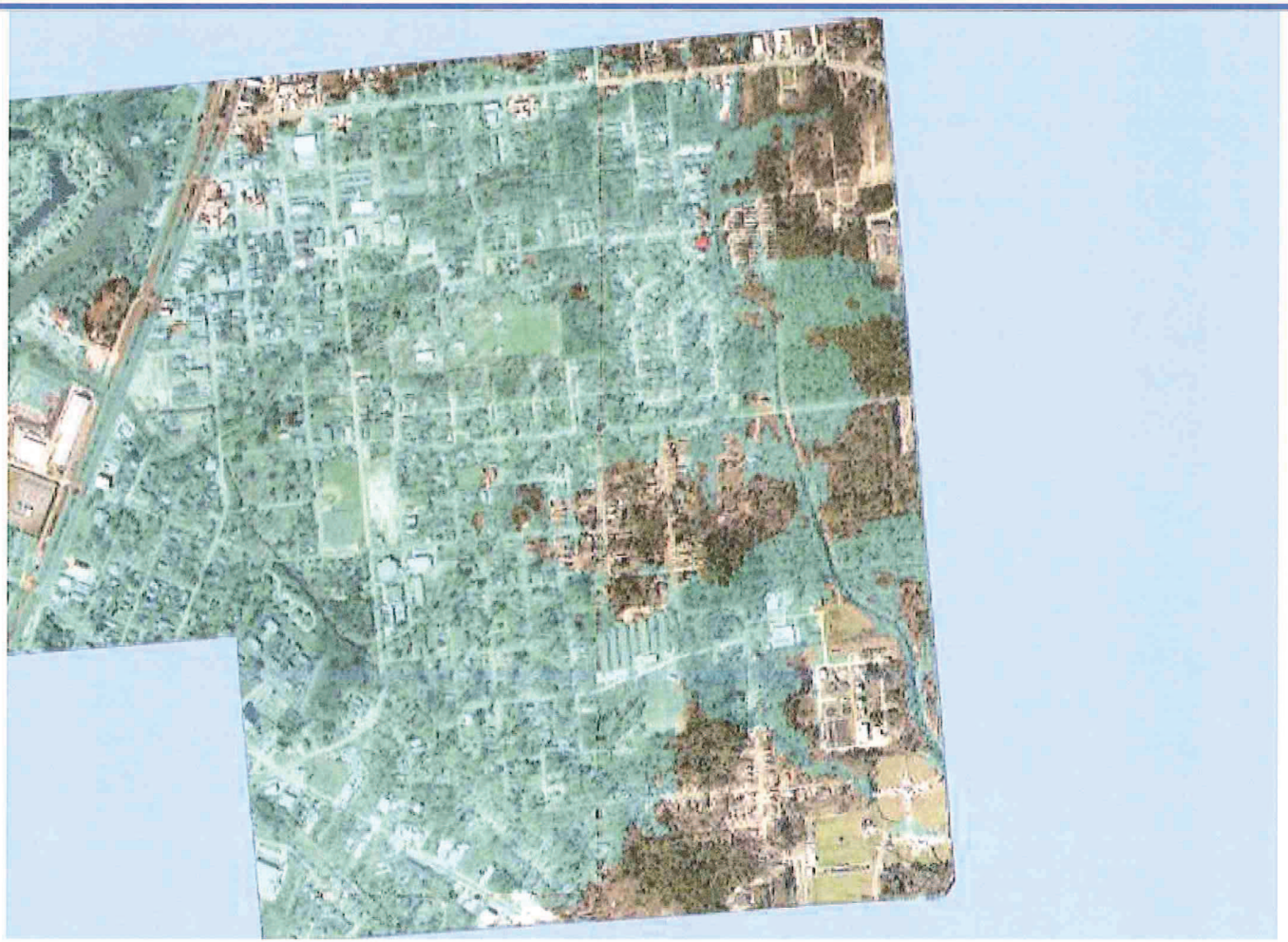
STATE OF LOUISIANA
SEAN M. BURKES
REG. No. 4785
REGISTERED
LAND SURVEYOR

SEAN M. BURKES
LA REG. NO. 4785

M:\SURVEYING\2013\BOUNDARY SURVEY\T09-R14\SEC10-44, T9SR14E, BAYOU PATTASAT,2013temp, CITY OF SLIDELL\dwg\20130547 X SEC.DWG



SCALE:	NTS
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	1 OF 4

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EXISTING CONDITIONS MODEL
10YR EVENT– BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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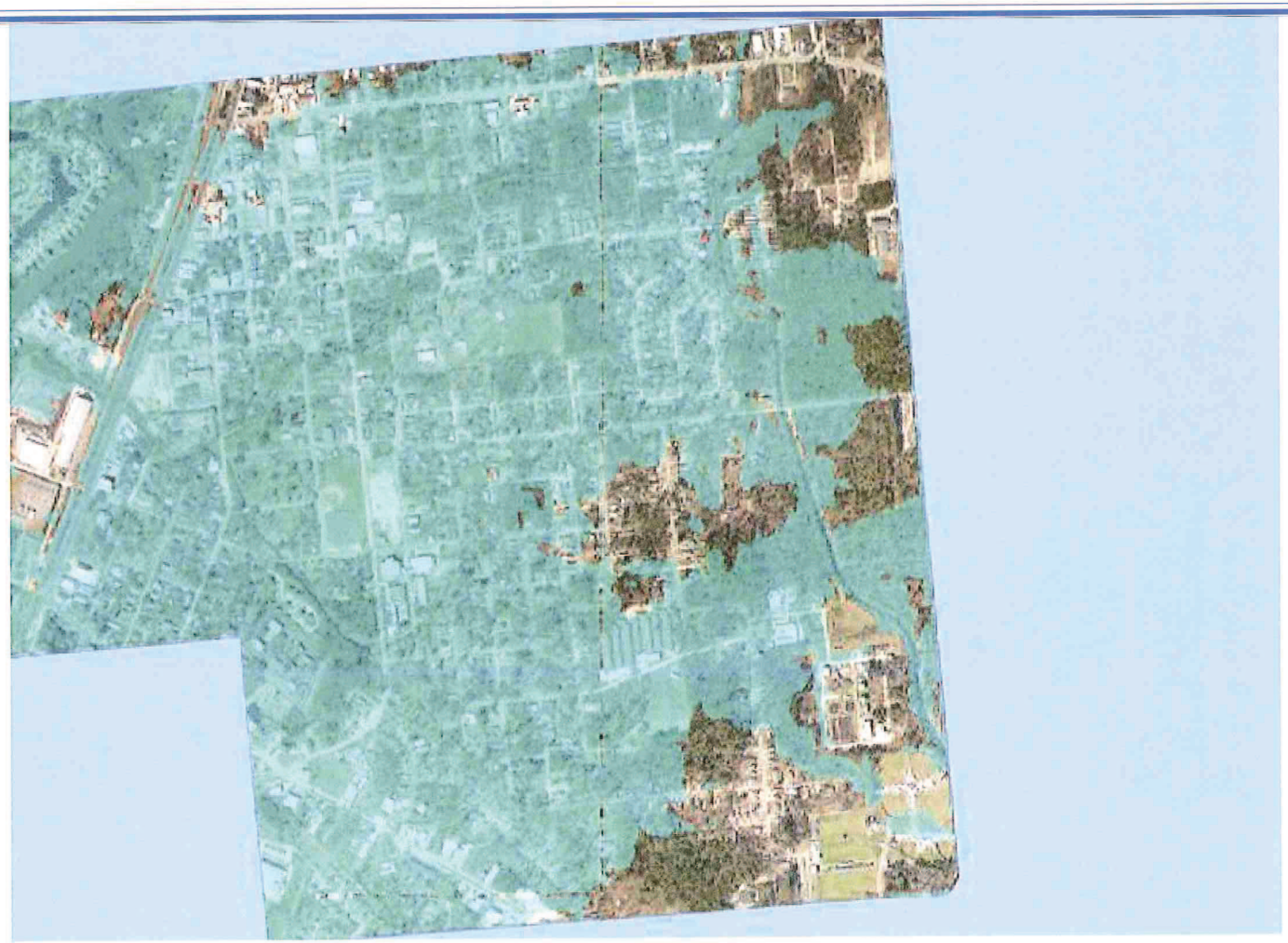
SEAN M. BURKES
LA REG. NO. 4785



SCALE:	NTS
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	2 OF 4

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EXISTING CONDITIONS MODEL
25YR EVENT– BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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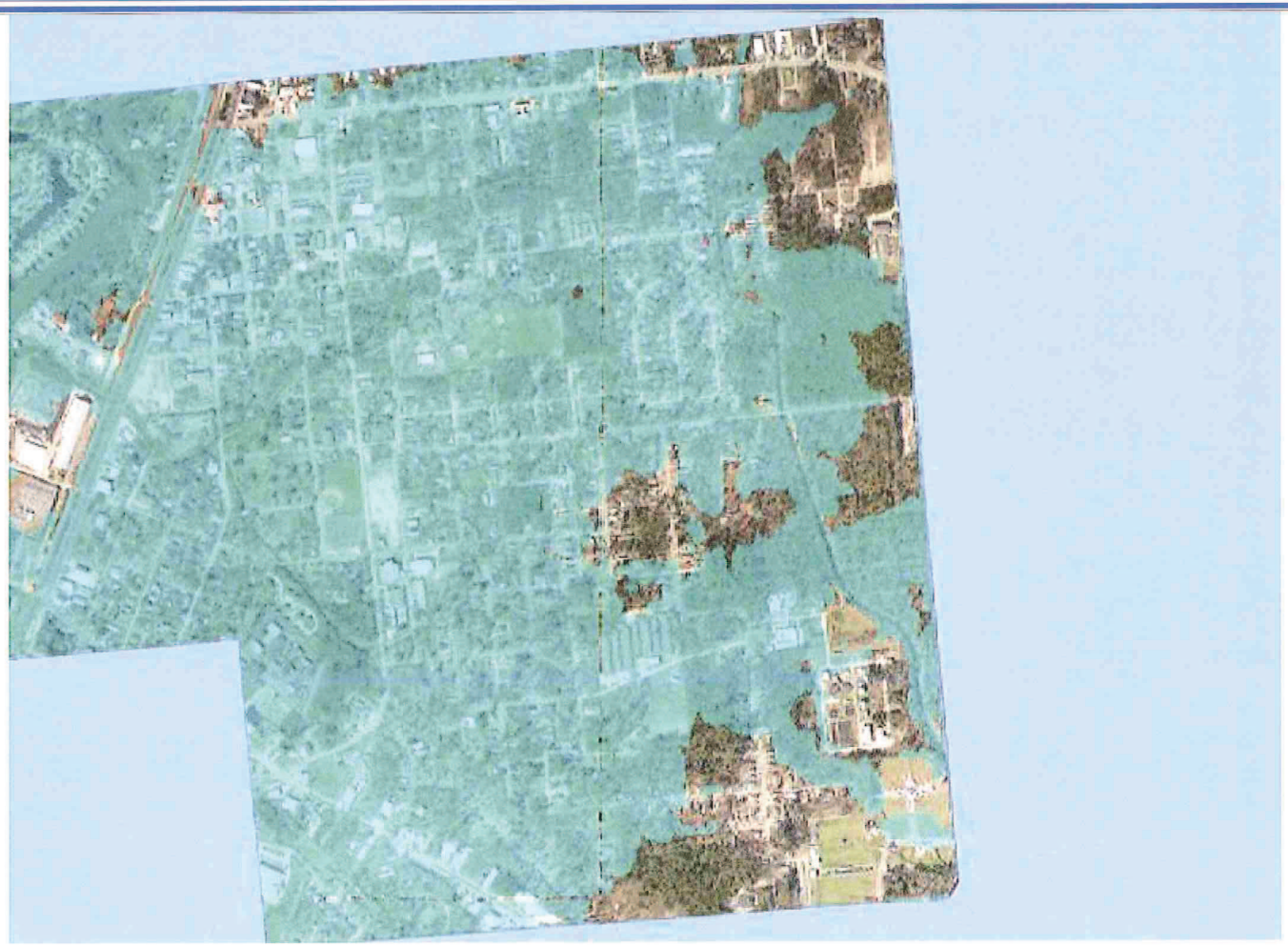

SCALE:	NTS
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	3 OF 4

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EXISTING CONDITIONS MODEL
50YR EVENT– BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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SEAN M. BURKES
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SCALE:	NTS
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	4 OF 4

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EXISTING CONDITIONS MODEL
100YR EVENT– BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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SEAN M. BURKES
LA REG. NO. 4785

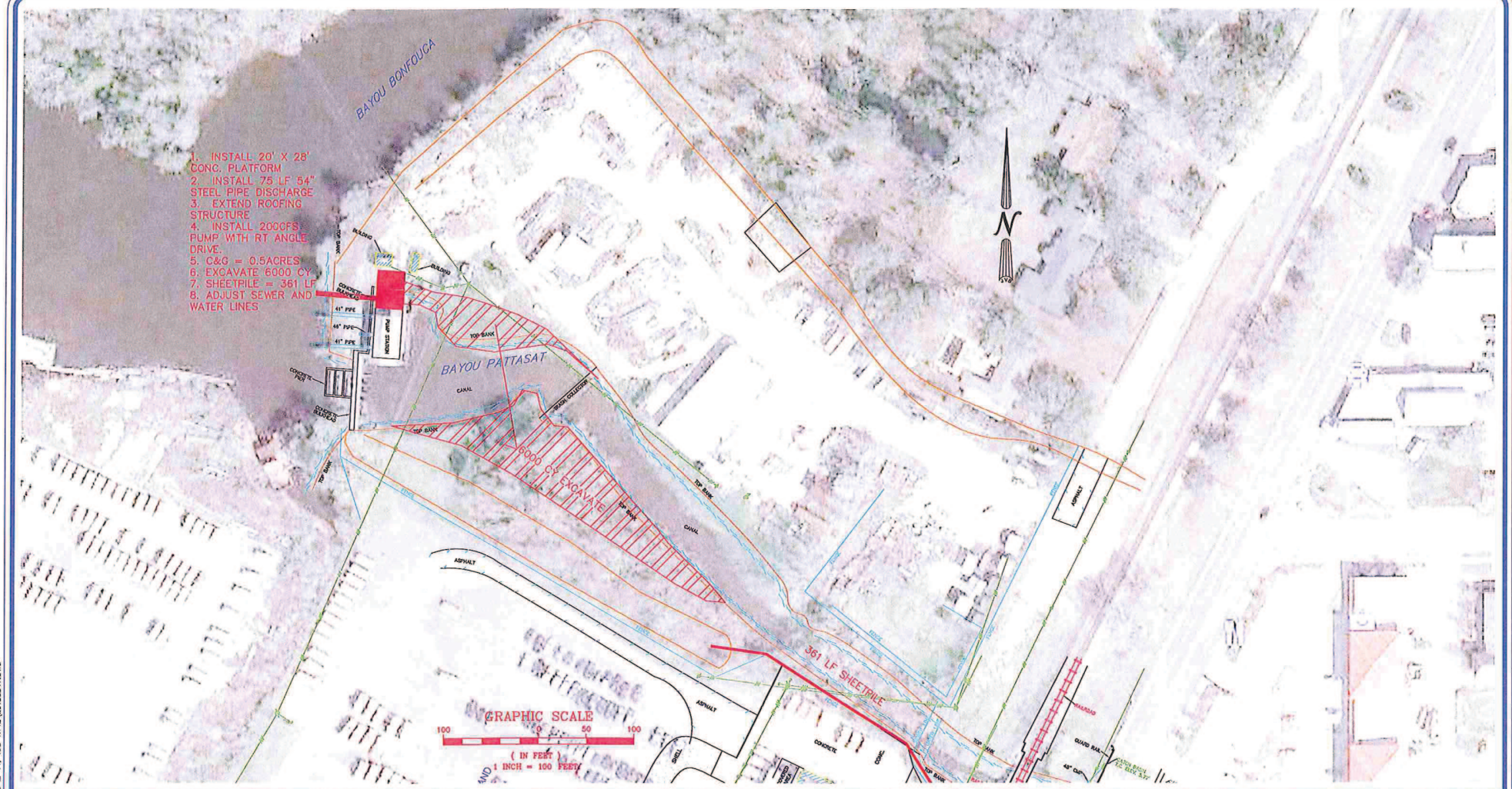
C-2

OPTION #1 (ADD 200CFS PUMP)

Option 1. (ADD 200CFS PUMP).

This option adds a 20' x 28' section of concrete platform to the existing pump station foundation. A 75 lf 54" steel discharge pipe , roof structure and a 200cfs right angle drive should be added. The channel is proposed to be straightened and enlargened to help with debris and intake flow to the pumps and a 361 lf section of sheetpile should be added to the steep slope section adjacent to the parking lot at Textron. Soil analysis has shown that this area will fail without this protection. The elevation of the sheet pile shall be at 10.0 feet to continue the berm section elevation.

Since the overall basin has much greater flow than the pumps can handle, any increase in pump size will help. The 200cfs increase in flow is modelled irrespective of the head, so generally the bigger the benefit is noticed for the lower storm events. But still great benefits are noted for the large events.



SCALE:	1" = 100'
DATE:	01/12/2014
DRAWN BY:	SMB
CHECKED BY:	SMB
DWG. NO:	2010177-OPT1
SHEET	1 OF 5

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I have consulted the Flood Insurance Rate Maps and found this property ___is in___ a Special Flood Hazard Area.

F.I.R.M.: 220204 0010C
DATE: 04/21/1999
ZONE: Zone AE
B.F.E. = EL. 9'

* Verify prior to construction with local governing body.

OPTION #1
ADD 200 CFS PUMP
CITY BARN PUMPING STATION
LOCATED IN CITY OF SLIDELL
ST. TAMMANY PARISH, LA

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CITY OF SLIDELL

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SEAN M. BURKES
LA REG. NO. 27642

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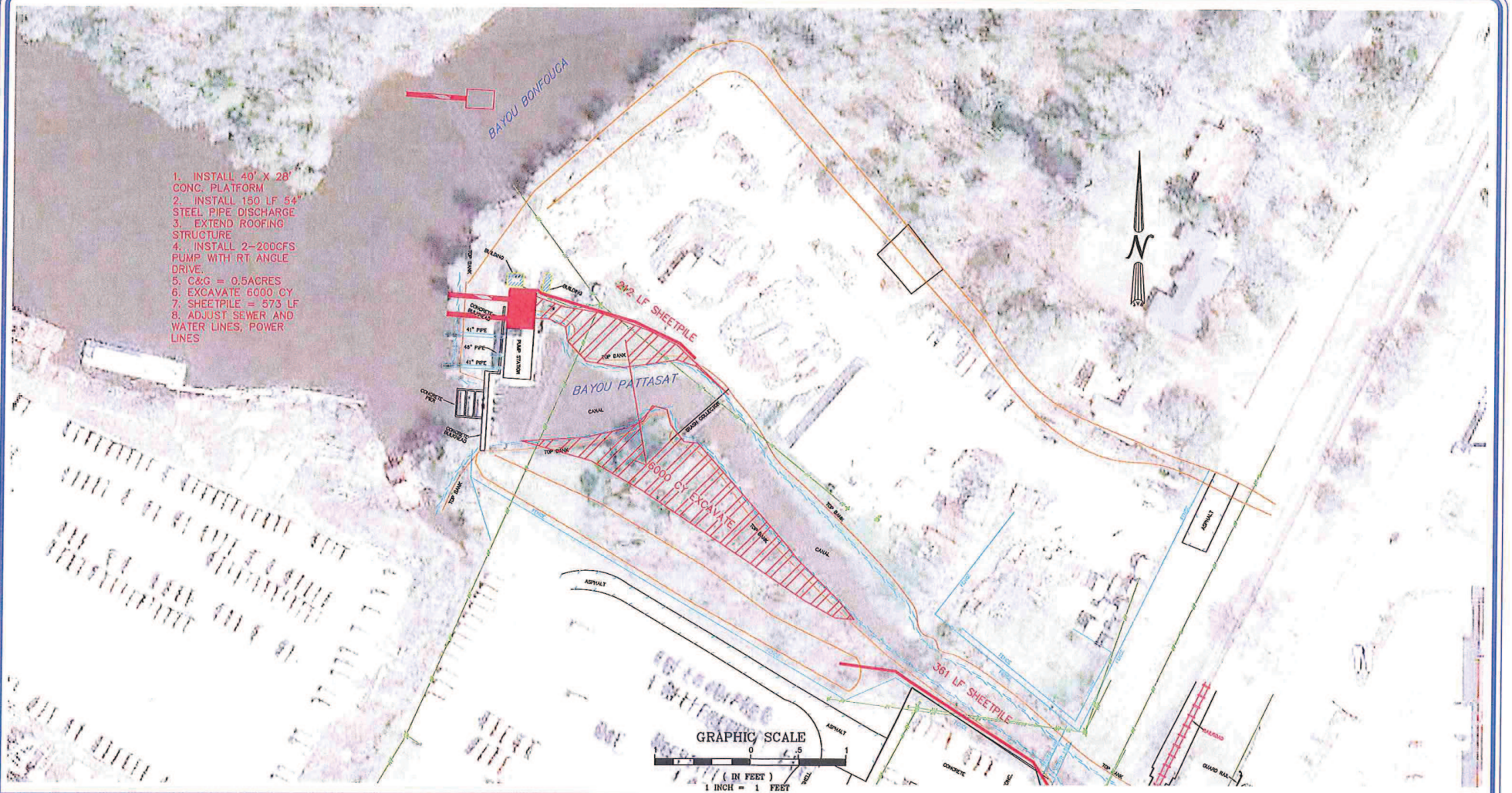
C-3

OPTION #2 (ADD 400 CFS PUMPS)

Option 2. (ADD 2-200CFS PUMP).

This option adds a 40' x 28' section of concrete platform to the existing pump station foundation. A 150 lf 54" steel discharge pipe , roof structure and 2-200cfs right angle drive should be added. The channel is proposed to be straightened and enlargened to help with debris and intake flow to the pumps and a 361 lf section of sheetpile should be added to the steep slope section adjacent to the parking lot at Textron. Soil analysis has shown that this area will fail without this protection. The elevation of the sheet pile shall be at 10.0 feet to continue the berm section elevation.

Since the overall basin has much greater flow than the pumps can handle, any increase in pump size will help. The 400cfs increase in flow is modelled irrespective of the head, so generally the bigger the benefit is noticed for the lower storm events. But still great benefits are noted for the large events.



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SCALE:	1" = 100'
DATE:	01/12/2014
DRAWN BY:	SMB
CHECKED BY:	SMB
DWG. NO:	2010177-OPT2
SHEET	2 OF 5

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I have consulted the Flood Insurance Rate Maps and found this property ___is in___ a Special Flood Hazard Area.

F.I.R.M.: 220204 0010C
DATE: 04/21/1999
ZONE: Zone AE
B.F.E. = EL. 9'

* Verify prior to construction with local governing body.

OPTION #2
ADD 2-200 CFS PUMP
CITY BARN PUMPING STATION
LOCATED IN CITY OF SLIDELL
ST. TAMMANY PARISH, LA

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CITY OF SLIDELL

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SEAN M. BURKES
LA REG. NO. 4785

C-4

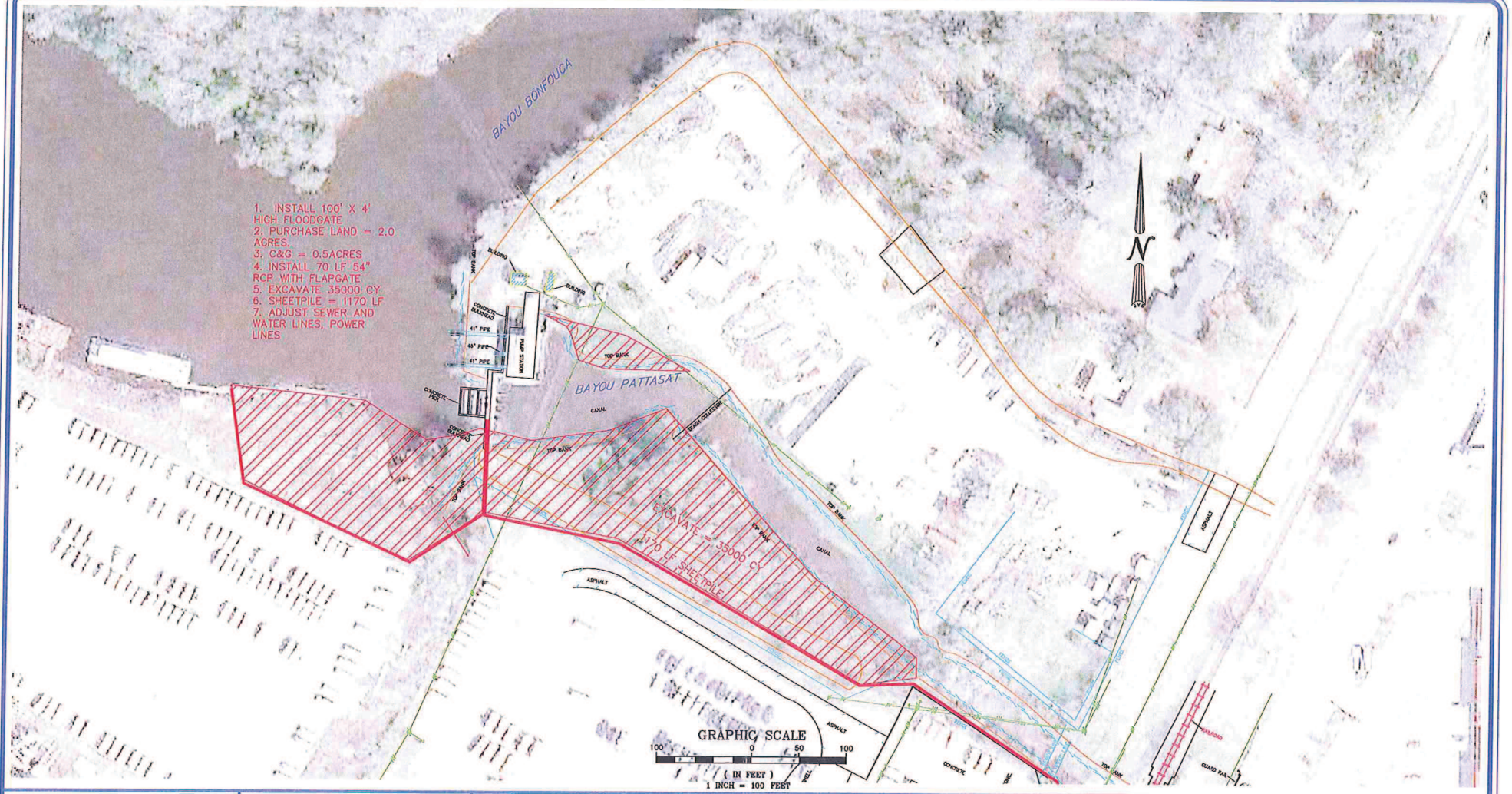
OPTION #3 (ADD FLOODGATES 400SF)

Option 3. (ADD 400 sf flood gates).

This option adds a 100' x 4' high floodgate. The channel is proposed to be straightened and enlargened to help with debris and intake flow to the pumps and a 1170lf section of sheetpile should be added to the steep slope section adjacent to Textron. Soil analysis has shown that this area will fail without this protection. The elevation of the sheet pile shall be at 10.0 feet to continue the berm section elevation. A section of material should be excavated on the Bayou Bonfouca side to allow for gravity flow to occur into the Bayou.

The HEC-RAS unsteady model – looks at rainfall and a boundary condition of 3'. Based upon this, option #3 is a wonderful improvement for rain events. The last three expensive flooding events within this basin were all hurricane storm surge events. This option does not help at all with this type of event and therefore it was decided by the City to first address the pump station issues first that will help in all situations.

However it was noted that this option produces the best elevation reduction benefit of all the rain tested models.



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SCALE:	1" = 100'
DATE:	01/12/2014
DRAWN BY:	SMB
CHECKED BY:	SMB
DWG. NO:	2010177-OPT3
SHEET	3 OF 5

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I have consulted the Flood Insurance Rate Maps and found this property ___is in___ a Special Flood Hazard Area.

F.I.R.M.: 220204 0010C
DATE: 04/21/1999
ZONE: Zone AE
B.F.E. = EL. 9'

* Verify prior to construction with local governing body.

OPTION #3
ADD 400sf GATE OPENING
CITY BARN PUMPING STATION
LOCATED IN CITY OF SLIDELL
ST. TAMMANY PARISH, LA

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SEAN M. BURKES
LA REG. NO. 4785

C-5

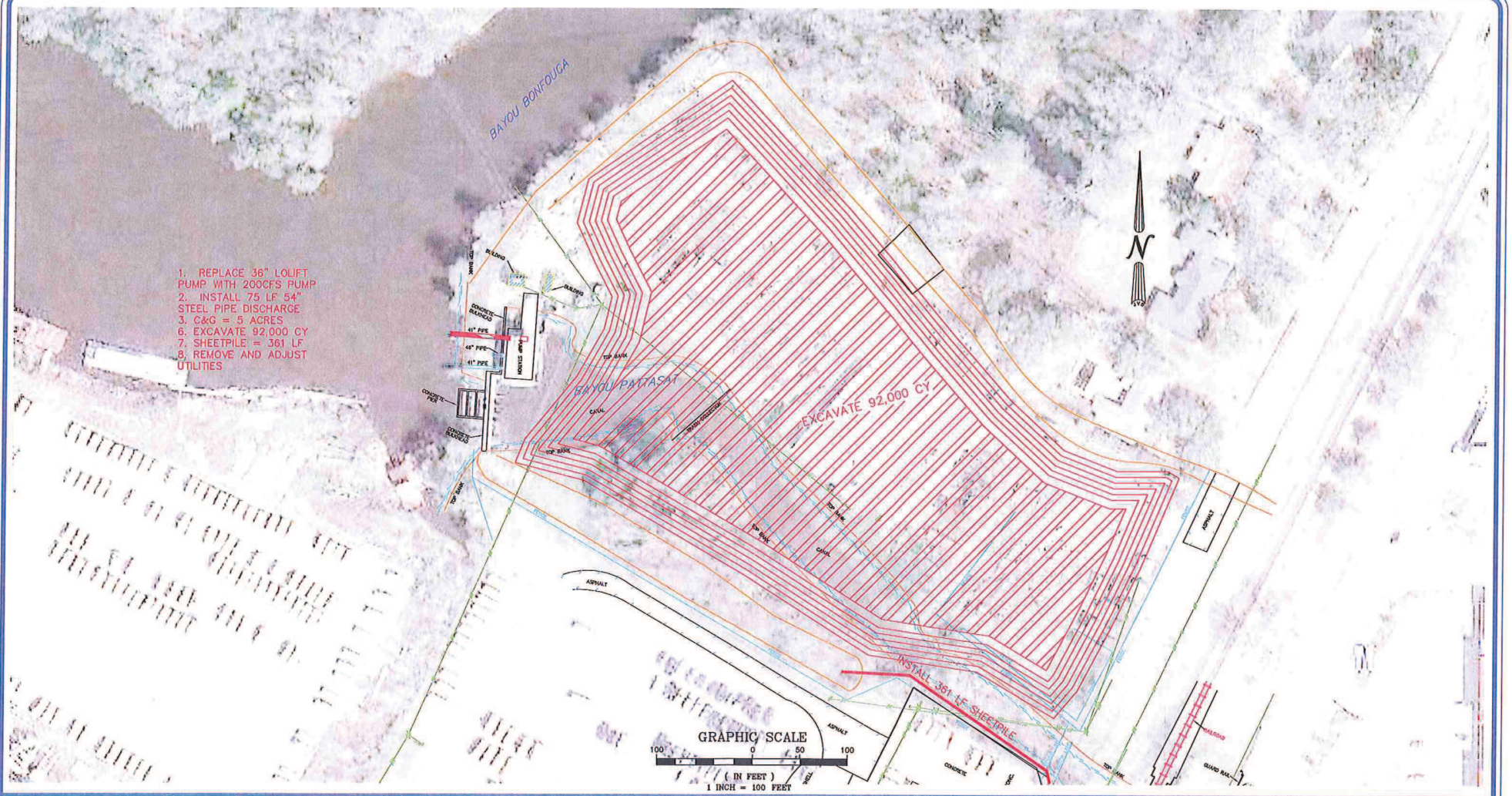
OPTION #4 (REPLACE 67 cfs PUMP WITH 200 cfs PUMP AND CONSTRUCT 5 ACRE POND)

Option 4. (Replace 67 cfs pump with 200cfs pump and construct 5 acre basin).

This replaces and existing 67 cfs pump with a 200cfs pump, installs a 75lf 54" steel pipe discharge, excavated 92,000 cy of material for a basin, adds a 361 lf section of sheetpile should be added to the steep slope section adjacent to Textron. Soil analysis has shown that this area will fail without this protection. The elevation of the sheet pile shall be at 10.0 feet to continue the berm section elevation.
.

This option wanted to make sure we had enough stormwater adjacent to the pumps as possible to allow for optimized operation. The pump helps drop the water surface elevation 4-5" and the pond drops the water surface elevation approx. 1.5". Please see full results.

The overall pond does not help as much with dropping the water surface elevation in the basin per the required cost to excavate.



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SCALE:	1" = 100'
DATE:	01/12/2014
DRAWN BY:	SMB
CHECKED BY:	SMB
DWG. NO:	2010177-OPT4
SHEET	4 OF 5

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I have consulted the Flood Insurance Rate Maps and found this property ___is in___ a Special Flood Hazard Area.

F.I.R.M.: 220204 0010C
DATE: 04/21/1999
ZONE: Zone AE
B.F.E. = EL. 9'

* Verify prior to construction with local governing body.

OPTION #4
REPLACE 67cfs PUMP WITH 200cfs PUMP AND CONSTRUCT 5 ACRE POND
CITY BARN PUMPING STATION
CITY OF SLIDELL, ST. TAMMANY PARISH, LA

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SEAN M. BURKES
LA REG. NO. 4785

C-6

PHASE 1 OF OPTION#4

STRAIGHTEN CHANNEL AND REPLACE PUMP (DO NOT CONSTRUCT POND)

Option 4 – Phase 1. (STRAIGHTEN CHANNEL AND REPLACE PUMP (DO NOT CONSTRUCT POND)

This replaces and existing 67 cfs pump with a 200cfs pump, installs a 75lf 54" steel pipe discharge, straightens and add more intake storage volume for the pumps, adds a 361 lf section of sheetpile should be added to the steep slope section adjacent to Textron. Soil analysis has shown that this area will fail without this protection. The elevation of the sheet pile shall be at 10.0 feet to continue the berm section elevation. .

This option was created to lower the cost to approx. $1.5 million total budget while getting the most benefit for the cost. Please see full results.

Since the overall basin has much greater flow than the pumps can handle, any increase in pump size will help. The 133 cfs increase in flow is modelled irrespective of the head, so generally the bigger the benefit is noticed for the lower storm events. But still great benefits are noted for the large events.

The overall maps were created to show the reduction in flooding for each storm event , the total number of existing homesites that had land flooding removed for each storm was counted.

10yr – 309 homesites

25yr – 166 homesites

50yr – 174 homesites

100yr – 184 homesites

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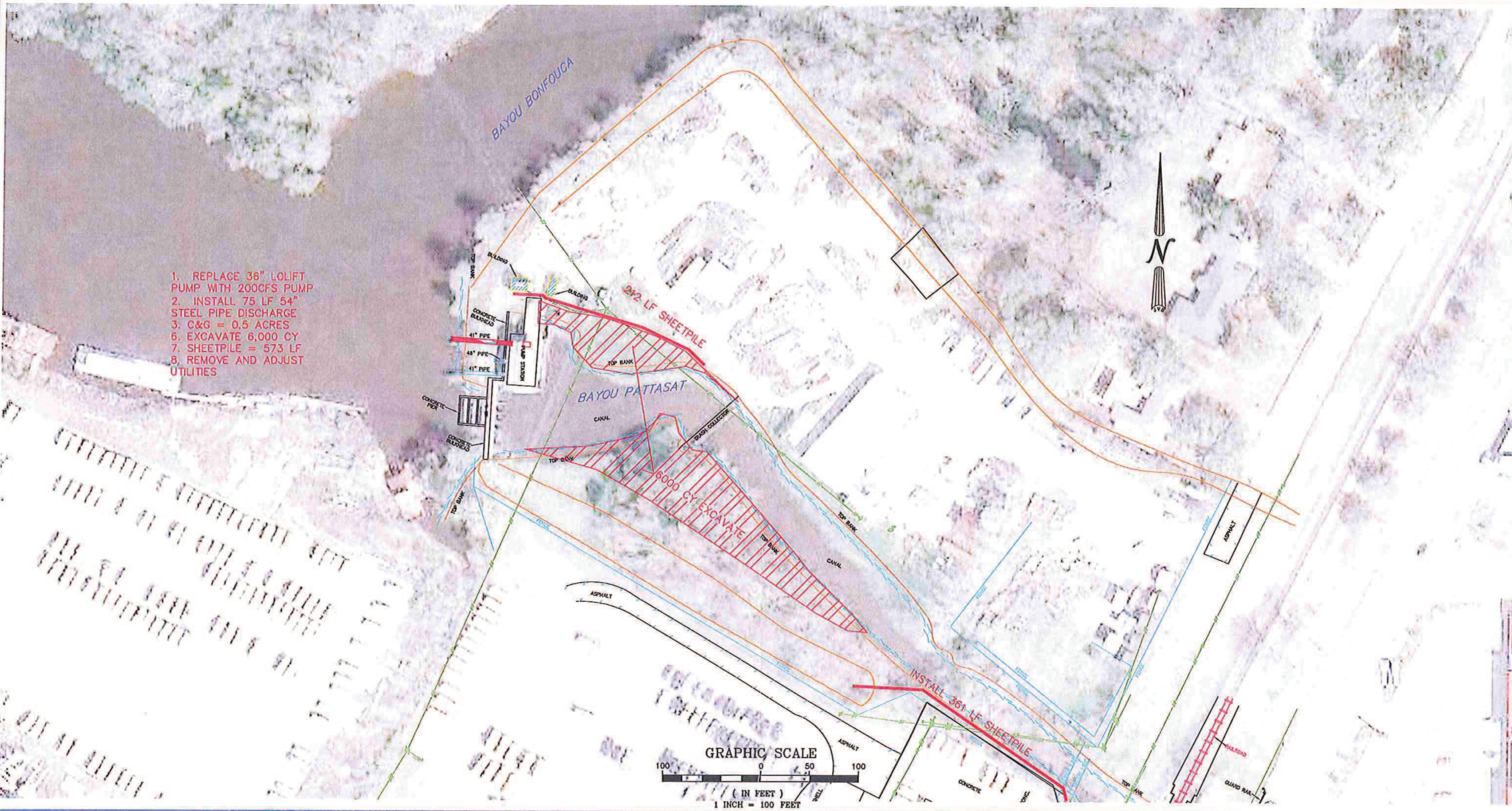

SCALE: 1" = 100'	
DATE: 01/12/2014	
DRAWN BY: SMB	CHECKED BY: SMB
DWG. NO: 2010177-OPT4	
SHEET 5 OF 5	

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F.I.R.M.: 220204 0010C
DATE: 04/21/1999
ZONE: Zone AE
B.F.E. = EL. 9'

* Verify prior to construction with local governing body.

OPTION #4 – PHASE 1
REPLACE 67cfs PUMP WITH 200cfs PUMP AND STRAIGHTEN CHANNEL
CITY BARN PUMPING STATION
CITY OF SLIDELL, ST. TAMMANY PARISH, LA

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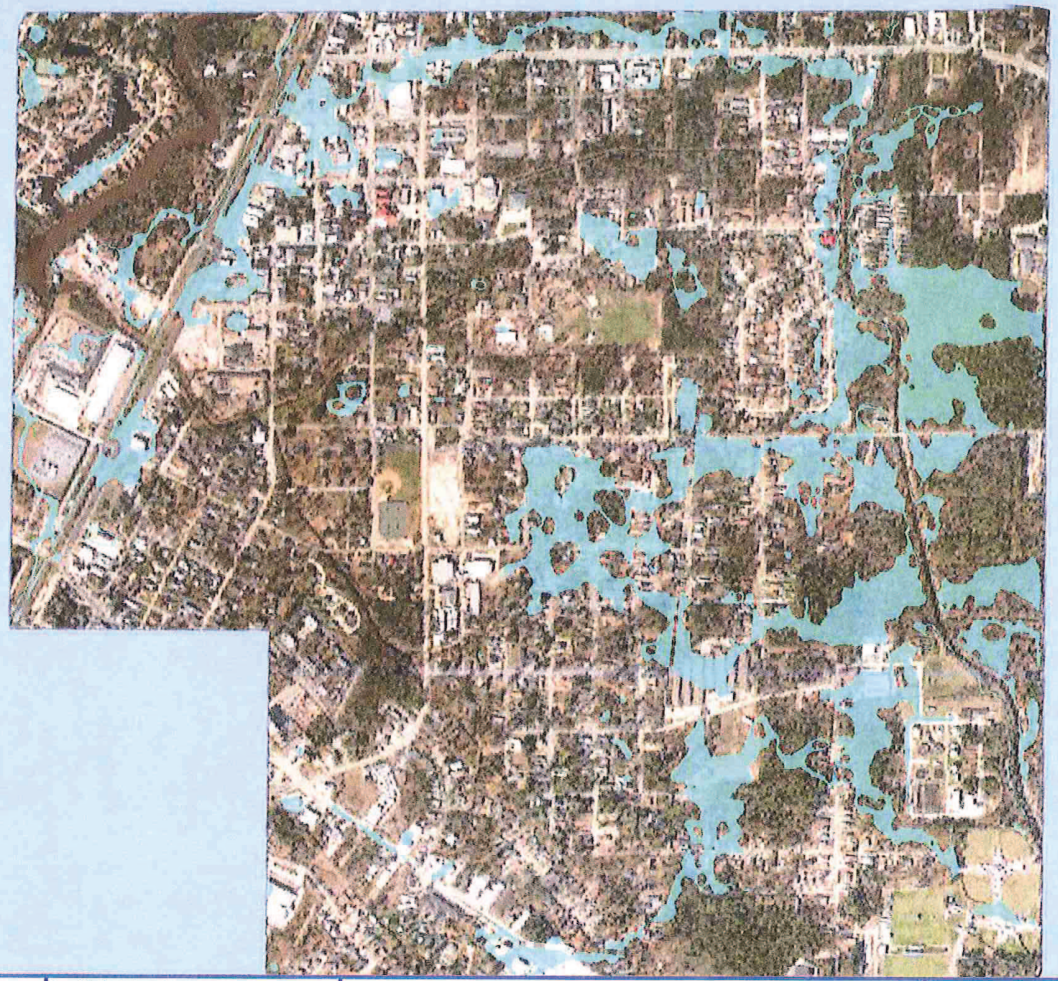

SCALE:	NTS
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	1 OF 4

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10 YR REDUCTION IN FLOODING AREA
OPTION 4 PHASE 1 BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

Declaration is made to original purchaser of the survey. It is not transferable to additional institutions or subsequent owners. Survey is valid only if print has original seal of surveyor. Property is not surveyed in accordance with the Louisiana "Minimum Standards for Property Boundary Surveys." Bearings are based on record bearings unless noted otherwise.

CITY OF SLIDELL

J.V. Burkes & Associates, Inc.

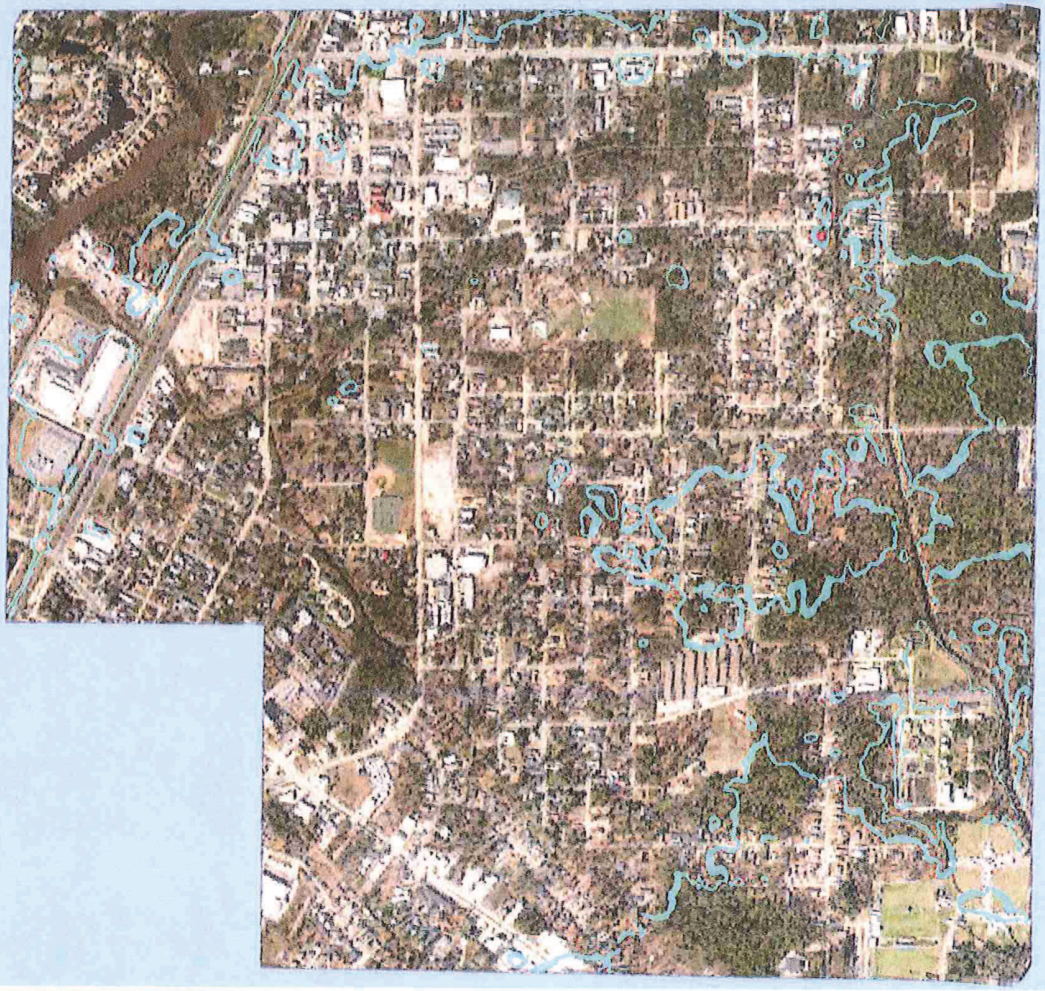
SURVEYING ENGINEERING • ENVIRONMENTAL

1805 HWY. 190 EAST
Slidell, Louisiana 70458
E-mail: jvbassoc@jvburkes.com

Phone: 985-649-0075 Fax: 985-649-0154
Mississippi Phone: 228-435-5800

SEAN M. BURKES
LA REG. NO. 4785

M:\SURVEYING\2013\BOUNDARY SURVEY\T09-R14\SEC10-44, T9S,R14E, BAYOU PATTASAT,2013comp, CITY OF SLIDELL\dwg\20130547 X SEC.DWG



SCALE:	NTS
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	2 OF 4

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25 YR REDUCTION IN FLOODING AREA
OPTION 4 PHASE 1 BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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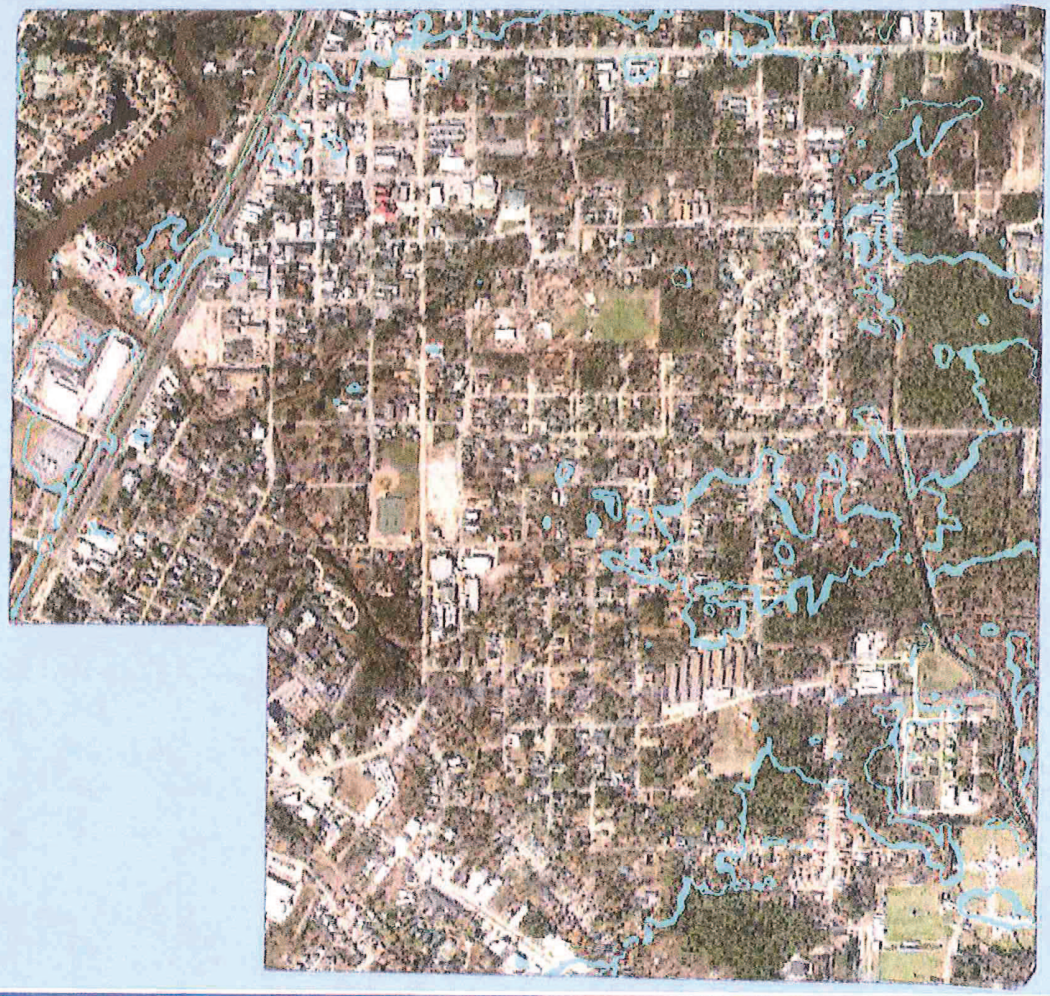

SCALE:	NTS
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	3 OF 4

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50 YR REDUCTION IN FLOODING AREA
OPTION 4 PHASE 1 BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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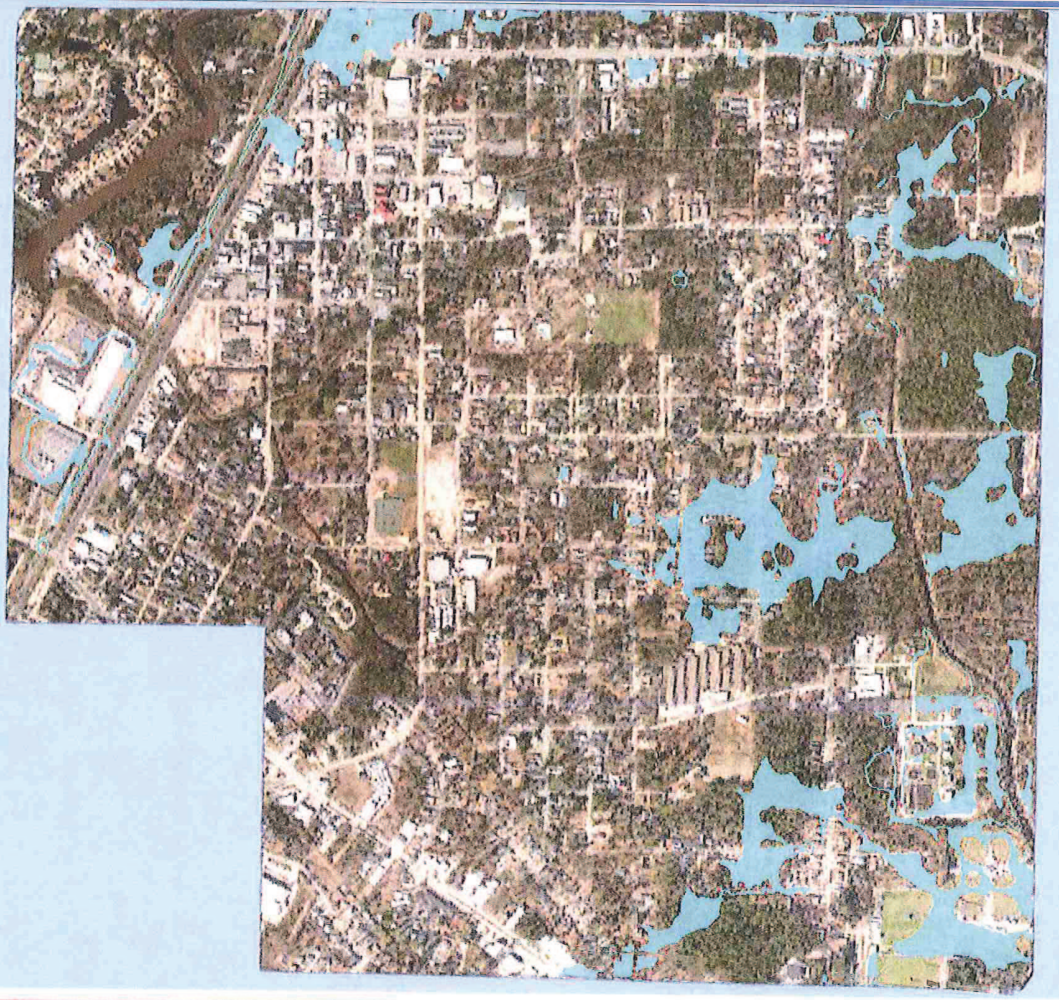

SCALE:	NTS
DATE:	04/17/2014
DRAWN BY:	BPT
CHECKED BY:	SMB
DWG. NO:	1234567
SHEET	4 OF 4

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100 YR REDUCTION IN FLOODING AREA
OPTION 4 PHASE 1 BAYOU PATTASAT
T9S – R14E, SECTION 10 & 44
CITY OF SLIDELL
ST. TAMMANY PARISH, LOUISIANA

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APPENDIX D

COST ESTIMATES

OPTION #1 - ADD 200 cfs pump

Item No.	Item Description	Unit	Estimated Unit Price	Estimated Quantity	Estimated Cost
	Supplemental Services (Pre-Engineering Design):				
	Surveying (Boundary/Topographic)- Initial	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Geotechnical Investigation- Initial	Lump Sum	$ 15,000.00	1	$ 15,000.00
	Utility Coordination & Relocation (if required)	Lump Sum	$ 25,000.00	1	$ 25,000.00
	ROW Acquisition-Drainage Servitude/Temporary Easements (if required)	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Engineering Design 8.9916% - Facility Planning & Control Fee Schedule 2011):				
	Design	Lump Sum			$ 39,032.62
	Construction Documents	Lump Sum			$ 39,032.62
	Bidding & Contracts	Lump Sum			$ 6,505.44
	Construction Administration	Not-to-Exceed (billed hourly)			$ 45,538.06
				Total A/E Phase:	$ 190,108.73

	Supplemental Services (Construction):				
	Geotechnical Testing:	Not-to-Exceed (billed at actual Cost)			$ 25,000.00
	Total Supplemental Services:	Not-to-Exceed (billed at actual Cost)			$ 25,000.00
				Total Estimated Supplemental Services Cost:	$ 50,000.00

	Construction:				
	INSTALL 20' X 28' CONCRETE PLATFORM WITH PILE FOUNDATION	LUMP SUM	$ 150,000.00	1	$ 150,000.00
	INSTALL 54" STEEL PIPE - PUMP DISCHARGE	LF	$ 2,100.00	54	$ 113,400.00
	INSTALL 200 CFS PUMP WITH RIGHT ANGLE SHAFT AND DIESEL ENGINE	LUMP SUM	$ 700,000.00	1	$ 700,000.00
	GENERATOR	LUMP SUM	$ 100,000.00	1	$ 100,000.00
	ROOFING FOR PLATFORM	LUMP SUM	$ 25,000.00	1	$ 25,000.00
	CLEAR & GRUB	ACRE	$ 20,000.00	0.5	$ 10,000.00
	EXCAVATION	CY	$ 22.00	6000	$ 132,000.00
	SHEETPILE	LF	$ 600.00	361	$ 216,600.00
				Total Estimated Construction Cost:	$ 1,447,000.00

OPTION #2 - ADD 2-200 cfs pump

Item No.	Item Description	Unit	Estimated Unit Price	Estimated Quantity	Estimated Cost
	Supplemental Services (Pre-Engineering Design):				
	Surveying (Boundary/Topographic)- Initial	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Geotechnical Investigation- Initial	Lump Sum	$ 15,000.00	1	$ 15,000.00
	Utility Coordination & Relocation (if required)	Lump Sum	$ 25,000.00	1	$ 25,000.00
	ROW Acquisition-Drainage Servitude/Temporary Easements (if required)	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Engineering Design (8.3561%- Facility Planning & Control Fee Schedule 2011):				
	Design	Lump Sum			$ 60,129.06
	Construction Documents	Lump Sum			$ 60,129.06
	Bidding & Contracts	Lump Sum			$ 10,021.51
	Construction Administration	Not-to-Exceed (billed hourly)			$ 70,150.57
				Total A/E Phase:	$ 260,430.21

	Supplemental Services (Construction):				
	Geotechnical Testing:	Not-to-Exceed (billed at actual Cost)			$ 25,000.00
	Total Supplemental Services:	Not-to-Exceed (billed at actual Cost)			$ 25,000.00
				Total Estimated Supplemental Services Cost:	$ 50,000.00

	Construction:				
	INSTALL 40' X 28' CONCRETE PLATFORM WITH PILE FOUNDATION	LUMP SUM	$ 275,000.00	1	$ 275,000.00
	INSTALL 54" STEEL PIPE - PUMP DISCHARGE	LF	$ 2,100.00	150	$ 315,000.00
	INSTALL 2-200 CFS PUMP WITH RIGHT ANGLE SHAFT AND DIESEL ENGINE	LUMP SUM	$ 650,000.00	2	$ 1,300,000.00
	GENERATOR	LUMP SUM	$ 100,000.00	1	$ 100,000.00
	ROOFING FOR PLATFORM	LUMP SUM	$ 50,000.00	1	$ 50,000.00
	CLEAR & GRUB	ACRE	$ 20,000.00	0.5	$ 10,000.00
	EXCAVATION	CY	$ 22.00	6000	$ 132,000.00
	SHEETPILE	LF	$ 600.00	361	$ 216,600.00
				Total Estimated Construction Cost:	$ 2,398,600.00

OPTION 3 - INSTALL 400SF FLOODGATE

Item No.	Item Description	Unit	Estimated Unit Price	Estimated Quantity	Estimated Cost
	Supplemental Services (Pre-Engineering Design):				
	Surveying (Boundary/Topographic)- Initial	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Geotechnical Investigation- Initial	Lump Sum	$ 15,000.00	1	$ 15,000.00
	Utility Coordination & Relocation (if required)	Lump Sum	$ 35,000.00	1	$ 35,000.00
	ROW Acquisition-Drainage Servitude/Temporary Easements (if required)	Lump Sum	$ 150,000.00	1	$ 150,000.00
	Engineering Design (8.382%- Facility Planning & Control Fee Schedule 2011):				
	Design	Lump Sum			$ 51,795.86
	Construction Documents	Lump Sum			$ 51,795.86
	Bidding & Contracts	Lump Sum			$ 8,632.64
	Construction Administration	Not-to-Exceed (billed hourly)			$ 60,428.50
				Total A/E Phase:	$ 382,652.86

	Supplemental Services (Construction):				
	Geotechnical Testing:	Not-to-Exceed (billed at actual Cost)			$ 25,000.00
	Total Supplemental Services:	Not-to-Exceed (billed at actual Cost)			$ 25,000.00
				Total Estimated Supplemental Services Cost:	$ 50,000.00

	Construction:				
	INSTALL 400 SF FLOODGATE	LF	$ 4,500.00	120	$ 540,000.00
	INSTALL 54" RCP PIPE - WITH GATE	LF	$ 700.00	54	$ 37,800.00
	CLEAR & GRUB	ACRE	$ 20,000.00	0.5	$ 10,000.00
	EXCAVATION	CY	$ 22.00	35000	$ 770,000.00
	SHEETPILE	LF	$ 600.00	1170	$ 702,000.00
				Total Estimated Construction Cost:	$ 2,059,800.00

OPTION #4 - REPLACE 67 CFS PUMP WITH 200CFS PUMP AND EXCAVATE 5 ACRE SUMP POND

Item No.	Item Description	Unit	Estimated Unit Price	Estimated Quantity	Estimated Cost
	Supplemental Services (Pre-Engineering Design):				
	Surveying (Boundary/Topographic)- Initial	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Geotechnical Investigation- Initial	Lump Sum	$ 15,000.00	1	$ 15,000.00
	Utility Coordination & Relocation (if required)	Lump Sum	$ 25,000.00	1	$ 25,000.00
	ROW Acquisition-Drainage Servitude/Temporary Easements (if required)	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Engineering Design 8.371% - Facility Planning & Control Fee Schedule 2011):				
	Design	Lump Sum			$ 55,351.53
	Construction Documents	Lump Sum			$ 55,351.53
	Bidding & Contracts	Lump Sum			$ 9,225.25
	Construction Administration	Not-to-Exceed (billed hourly)			$ 64,576.78
				Total A/E Phase:	$ 244,505.09

	Supplemental Services (Construction):		
	Geotechnical Testing:	Not-to-Exceed (billed at actual Cost)	$ 25,000.00
	Total Supplemental Services:	Not-to-Exceed (billed at actual Cost)	$ 25,000.00
		Total Estimated Supplemental Services Cost:	$ 50,000.00

	Construction:				
	REMOVE EXISTING PUMP AND RIGHT ANGLE SHAFT- DISCHARGE	LUMP SUM	$ 10,000.00	1	$ 10,000.00
	INSTALL 54" STEEL PIPE - PUMP DISCHARGE	LF	$ 2,100.00	75	$ 157,500.00
	INSTALL 200 CFS PUMP WITH RIGHT ANGLE SHAFT AND DIESEL ENGINE	LUMP SUM	$ 700,000.00	1	$ 700,000.00
	GENERATOR	LUMP SUM	$ 100,000.00	1	$ 100,000.00
	CLEAR & GRUB	ACRE	$ 20,000.00	5	$ 100,000.00
	EXCAVATION	CY	$ 10.00	92000	$ 920,000.00
	SHEETPILE	LF	$ 600.00	361	$ 216,600.00
				Total Estimated Construction Cost:	$ 2,204,100.00

OPTION #4-PHASE 1 - REPLACE 67 CFS PUMP WITH 200CFS PUMP AND STRAIGHTEN CHANNEL

Item No.	Item Description	Unit	Estimated Unit Price	Estimated Quantity	Estimated Cost
	Supplemental Services (Pre-Engineering Design):				
	Surveying (Boundary/Topographic)- Initial	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Geotechnical Investigation- Initial	Lump Sum	$ 15,000.00	1	$ 15,000.00
	Utility Coordination & Relocation (if required)	Lump Sum	$ 25,000.00	1	$ 25,000.00
	ROW Acquisition-Drainage Servitude/Temporary Easements (if required)	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Engineering Design 9.0501% - Facility Planning & Control Fee Schedule 2011):				
	Design	Lump Sum			$ 36,004.01
	Construction Documents	Lump Sum			$ 36,004.01
	Bidding & Contracts	Lump Sum			$ 6,000.67
	Construction Administration	Not-to-Exceed (billed hourly)			$ 42,004.68
				Total A/E Phase:	$ 180,013.38

	Supplemental Services (Construction):		
	Geotechnical Testing:	Not-to-Exceed (billed at actual Cost)	$ 25,000.00
	Total Supplemental Services:	Not-to-Exceed (billed at actual Cost)	$ 25,000.00
		Total Estimated Supplemental Services Cost:	$ 50,000.00

	Construction:				
	REMOVE EXISTING PUMP AND RIGHT ANGLE SHAFT- DISCHARGE	LUMP SUM	$ 10,000.00	1	$ 10,000.00
	INSTALL 54" STEEL PIPE - PUMP DISCHARGE	LF	$ 2,100.00	75	$ 157,500.00
	INSTALL 200 CFS PUMP WITH RIGHT ANGLE SHAFT AND DIESEL ENGINE	LUMP SUM	$ 700,000.00	1	$ 700,000.00
	GENERATOR	LUMP SUM	$ 100,000.00	1	$ 100,000.00
	CLEAR & GRUB	ACRE	$ 20,000.00	0.5	$ 10,000.00
	EXCAVATION	CY	$ 22.00	6000	$ 132,000.00
	SHEETPILE	LF	$ 600.00	361	$ 216,600.00
				Total Estimated Construction Cost:	$ 1,326,100.00

RECONSTRUCT BERM TO 11' ELEVATION

Item No.	Item Description	Unit	Estimated Unit Price	Estimated Quantity	Estimated Cost
	Supplemental Services (Pre-Engineering Design):				
	Surveying (Boundary/Topographic)- Initial	Lump Sum	$ 10,000.00	1	$ 10,000.00
	Geotechnical Investigation- Initial	Lump Sum	$ 15,000.00	1	$ 15,000.00
	Utility Coordination & Relocation (if required)	Lump Sum	$ 25,000.00	1	$ 25,000.00
	ROW Acquisition-Drainage Servitude/Temporary Easements (if required)	Lump Sum	$ 100,000.00	1	$ 100,000.00
	Engineering Design 9.1672% - Facility Planning & Control Fee Schedule 2011:				
	Design	Lump Sum			$ 29,817.11
	Construction Documents	Lump Sum			$ 29,817.11
	Bidding & Contracts	Lump Sum			$ 4,969.52
	Construction Administration	Not-to-Exceed (billed hourly)			$ 34,786.62
				Total A/E Phase:	$ 249,390.35

	Supplemental Services (Construction):				
	Geotechnical Testing:	Not-to-Exceed (billed at actual Cost)			$ 25,000.00
	Total Supplemental Services:	Not-to-Exceed (billed at actual Cost)			$ 25,000.00
				Total Estimated Supplemental Services Cost:	$ 50,000.00

	Construction:				
	REMOVE EXISTING BERM MATERIAL	CY	$ 10.00	8000	$ 80,000.00
	CLEAR & GRUB	ACRE	$ 20,000.00	2	$ 40,000.00
	FILL - CLAY -	CY	$ 18.00	18200	$ 327,600.00
	SHEETPILE	LF	$ 600.00	1061	$ 636,600.00
				Total Estimated Construction Cost:	$ 1,084,200.00