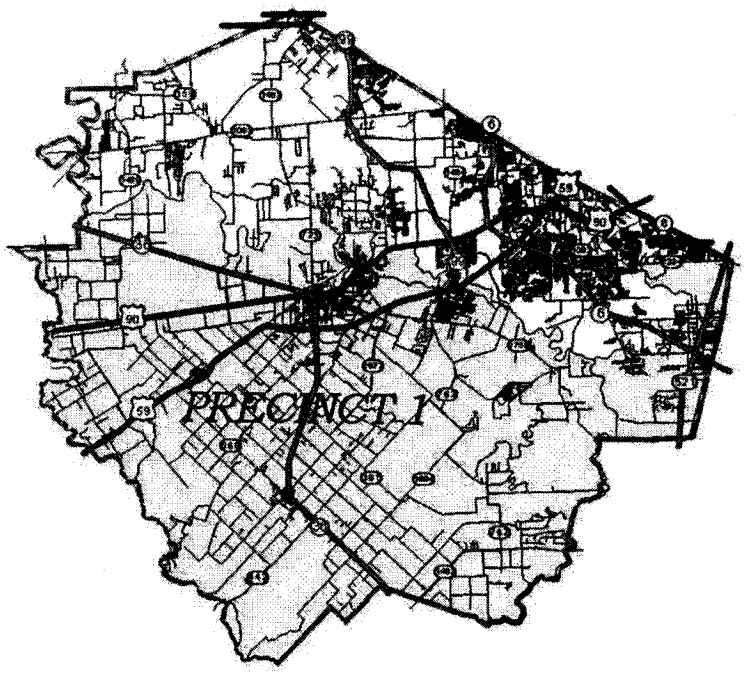
EXHIBIT A

ORIGINAL GRANT APPLICATION

DRAFT

PROJECT SCOPE, BUDGET, AND SCHEDULE PROPOSAL FOR PHASE 1 OF A FLOOD PROTECTION PLANNING STUDY

Flood Protection Study for the Gapps Bayou Watershed
Commissioner Precinct 1, Fort Bend County, Texas



Prepared by

r.g. miller engineers

May 17, 2011

INTRODUCTION

This document presents a proposal for Phase 1 of a study of the Gapps Bayou in Fort Bend County, Texas. The scope of work for the study represents a portion of the overall scope originally proposed in connection with a flood protection planning grant application submitted to the Texas Water Development Board in January 2011 for the Gapps Bayou and Rabbs Bayou watersheds. Due to funding limitations, the entire scope presented in the original grant application cannot be funded by the TWDB at this time. However, partial funding is available, and it is proposed that that funding be directed toward the first portion of the Gapps Bayou study, which involves an analysis of existing conditions within that watershed.

PROPOSED PLANNING AREA

The proposed planning area involves the Gapps Bayou (aka Gapps Slough) watershed, which covers a total area of approximately 5,060 acres (7.9 square miles). Most of the watershed lies within unincorporated areas of Fort Bend County, Texas, although a small portion lies within the incorporated boundary of the City of Rosenberg, Texas. The watershed is partially developed. Subdivisions located within the Gapps Bayou watershed include Summer Lakes, Summer Creek, Bridlewood Estates, Royal Lakes Estates, Rivers Mist, and River Run at the Brazos. Figure 1 illustrates the existing condition of the watershed.

Recent changes in 1% annual chance flood elevations along the Brazos River and the development of modeling data for the Gapps Bayou watershed indicate that existing developments will likely be affected by flooding during extreme events. The selection of this particular watershed for study was supported by representatives of the Fort Bend County Drainage District and Fort Bend County Precinct 1.

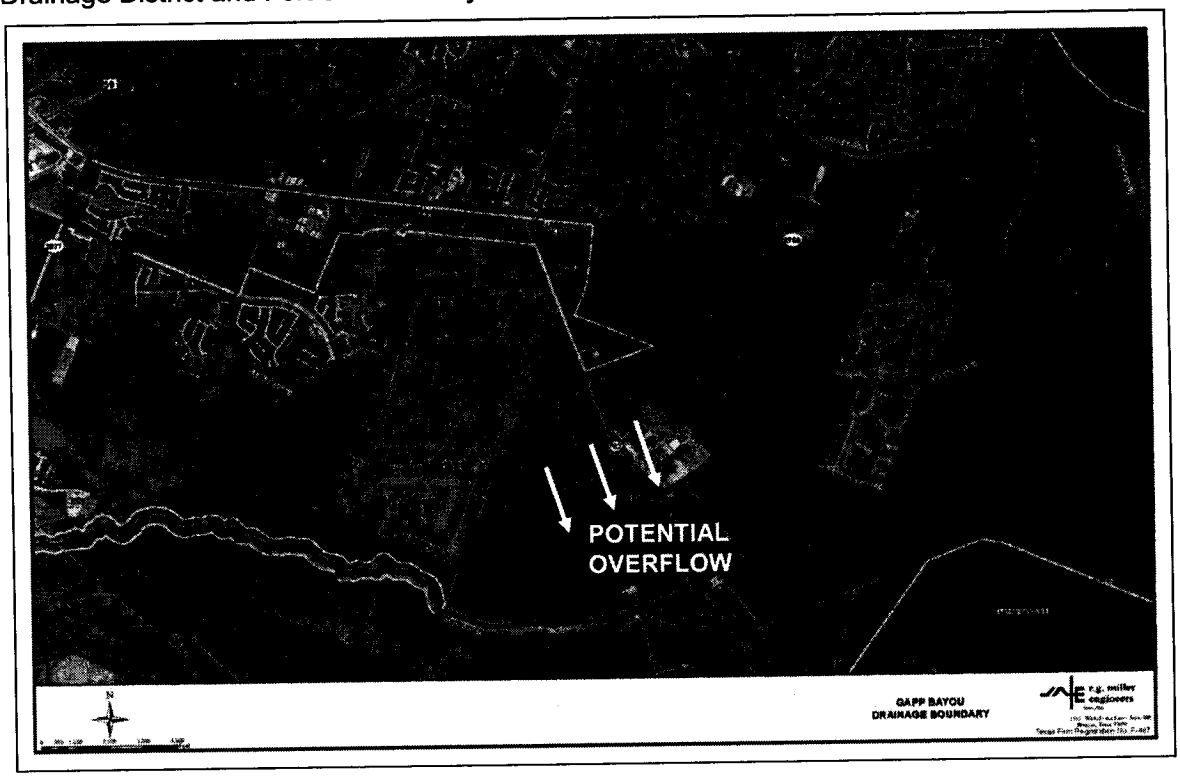


Figure 1: Approximate 1% Floodplain in the Area of the Bridlewood Estates Subdivision



PROPOSED SCOPE OF WORK

The following scope of work describes the major tasks that will be undertaken and completed in connection with Phase 1 of the proposed flood protection planning study.

1. **Gather and Review Information:** Gather and review information on the proposed study watershed.
2. **Visit the Project Area:** Visit key locations within the subject watershed to obtain information on existing drainage patterns and facilities.
3. **Prepare Field Survey Plan:** Prepare a detailed plan for obtaining field survey data along Gapps Bayou, including channel cross-sections as well as information on bridges and culverts.
4. **Collect Field Survey Data:** Collect survey data in the field, ensuring that all data points are geo-referenced and tied to the latest vertical and horizontal datums.
5. **Develop Base Hydrologic Model:** Develop a base (current conditions) hydrologic model of the study watershed using the HEC-HMS software package. Use methods described in the Fort Bend County Drainage Criteria Manual to develop modeling data. Compute base conditions flow rates for 10-year, 50-year, 100-year, and 500-year storm events.
6. **Develop Base Hydraulic Model:** Develop a base (current conditions) hydraulic model of the study stream using the HEC-RAS software package. Use field survey data, LiDAR elevation data, and information obtained during field visits to develop the hydraulic modeling data. Compute base conditions flood levels for 10-year, 50-year, 100-year, and 500-year storm events, as well as floodway data.
7. **Map Existing Floodplain & Floodway:** Map existing conditions floodplain and floodway boundaries in accordance with FEMA mapping methods and requirements.
8. **Prepare Existing Conditions Report:** Prepare a report that details existing drainage conditions within the subject watershed.
9. **Meet w/ Cities, County, & FBCDD:** Meet with representatives of participating cities, Fort Bend County, and the Fort Bend County Drainage District to discuss the results of the existing conditions study effort.

PROPOSED PLANNING BUDGET

The total proposed planning cost for Phase 1 of the Gapps Bayou study is $52,380. That figure includes study costs, field survey costs, and miscellaneous expenses. Following is a breakdown of proposed study costs, with detailed estimates of hours to be worked by members of each staff category within the Storm Water Department at R.G. Miller Engineers, Inc. Costs are tabulated for each staff category and totaled. Note that these costs do not include the budget for field survey work. The requested planning budget is $37,580. A separate proposal from Miller Survey Group is attached. The total proposed charge for field survey services for the Gapps Bayou watershed is $14,800. Adding this amount to the proposed study cost yields a total study budget of $52,380.



BUDGET BREAKDOWN FOR PROPOSED GAPPS BAYOU FLOOD PROTECTION STUDY						
Task No.	Task Description	Sr. Project Manager	CAD/GIS Specialist	Project Engineer	Associate Engineer	Admin. Staff
1	Gather and Review Information	2	4	4	2	4
2	Visit the Project Area	8		12	12	
3	Prepare Field Survey Plan	2	4	2	4	
4	Collect Field Survey Data	Miller Survey Group				
5	Develop Base Hydrologic Model	12	16	48	12	
6	Develop Base Hydraulic Model	12	20	24	56	
7	Map Existing Floodplain & Floodway	4	16	4	6	
8	Prepare Existing Conditions Report	6	12	12	8	8
9	Meet w/ Cities, County, & FBCDD	8		8	8	4
Sub-Totals		54	72	114	108	16
Hourly Rate		$180	$110	$90	$80	$65
Budget for Individual Personnel		$9,720	$7,920	$10,260	$8,640	$1,040
TOTAL RGME BUDGET REQUIREMENT						**$37,580**

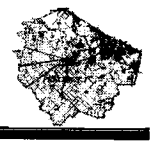
Following is a breakdown of the budget established for each of the tasks included in the scope of work. These budget numbers are totaled by task. The cost of survey work to be completed by Miller Survey Group is included in this breakdown of the total study budget requirement.

BREAKDOWN OF PROPOSED STUDY BUDGET BY TASK							
Task No.	Task Description	Sr. Project Manager	CAD/GIS Specialist	Project Engineer	Associate Engineer	Admin. Staff	Task Budget
1	Gather and Review Information	2	4	4	2	4	$1,580
2	Visit the Project Area	8		12	12		$3,480
3	Prepare Field Survey Plan	2	4	2	4		$1,300
4	Collect Field Survey Data	Miller Survey Group					$14,800
5	Develop Base Hydrologic Model	12	16	48	12		$9,200
6	Develop Base Hydraulic Model	12	20	24	56		$11,000
7	Map Existing Floodplain & Floodway	4	16	4	6		$3,320
8	Prepare Existing Conditions Report	6	12	12	8	8	$4,640
9	Meet w/ Cities, County, & FBCDD	8		8	8	4	$3,060
TOTAL STUDY BUDGET REQUIREMENT							**$52,380**

The available funding from the Texas Water Development Board is $21,238. Subtracting that amount from the total proposed study budget of $52,380 leaves Fort Bend County's share of the funding cost at $31,142, which constitutes 59.5% of the total. The TWDB share is 40.5% of the total cost.

PROJECT SCHEDULE

The total proposed contract execution time is 6 months, as indicated in the following preliminary schedule. An additional period of two months is provided at the beginning of the schedule to allow time for negotiations with Fort Bend County and to allow the County to approve the necessary contracts. The schedule allows for two public meetings, one at the beginning of the study to collect information from the public and the second near the end of the study to allow results to be presented to the public before they are finalized.



PROJECT SCHEDULE
GAPPS BAYOU WATERSHED
FLOOD PROTECTION PLANNING STUDY

TASK COMPLETION MILESTONES FOR GIVEN MONTH FROM PROJECT INITIATION													
Task No.	Task Description	1	2	3	4	5	6	7	8	9	10	11	12
ADMINISTRATIVE TASKS													
1	Negotiate Contract w/ Fort Bend County												
PROJECT MANAGEMENT & COORDINATION													
1	Overall Project Direction & Management												
2	Public Meetings												
3	Prepare Reports, Invoices, Etc.												
ACTUAL PROJECT TASKS													
1	Gather and Review Information												
2	Visit the Project Area												
3	Prepare Field Survey Plan												
4	Collect Field Survey Data												
5	Develop Base Hydrologic Model												
6	Develop Base Hydraulic Model												
7	Map Existing Floodplain & Floodway												
8	Prepare Existing Conditions Report												
9	Meet w/ Cities, County, & FBCDD												

EXPENSE BUDGET

An expense budget for the proposed study follows. The proposal provided by Miller Survey Group for field survey work is attached.

EXPENSE BUDGET
FORT BEND COUNTY PRECINCT ONE
GAPPS BAYOU WATERSHED
FLOOD PROTECTION PLANNING STUDY

Item No.	Category	Consultant	Total Budget
1	Salaries	$11,660	$11,660
2	Travel	$200	$200
3	Communication	$50	$50
4	Supplies	$50	$50
5	Tech/Computer	$30	$30
6	Reproduction	$300	$300
7	Subcontractor (Miller Survey Group)	$14,800	$14,800
8	Subcontractor (Crouch Environmental)	$0	$0
9	Benefits	$3,150	$3,150
10	Profit	$1,160	$1,160
11	Overhead / G&A	$20,980	$20,980
TOTALS		**$52,380**	**$52,380**

PROJECT PERSONNEL & ORGANIZATIONAL CHART

The following personnel will be involved in the proposed study. The organizational chart illustrates the general relationships between the various agencies, companies, and individuals proposed to be involved in the project.

- Duane Barrett, P.E., CFM – Project Manager
- Fred Bauhof, P.E. – Technical Advisor
- Jung P. Jang, P.E., CFM – Project Engineer
- Adam Rodriguez, P.E., CFM – Project Engineer
- Jeremy Blevins, E.I.T., CFM – Associate Engineer
- David Mouton – GIS/CAD Specialist
- Brian Wilson, R.P.L.S. – Field Survey Manager

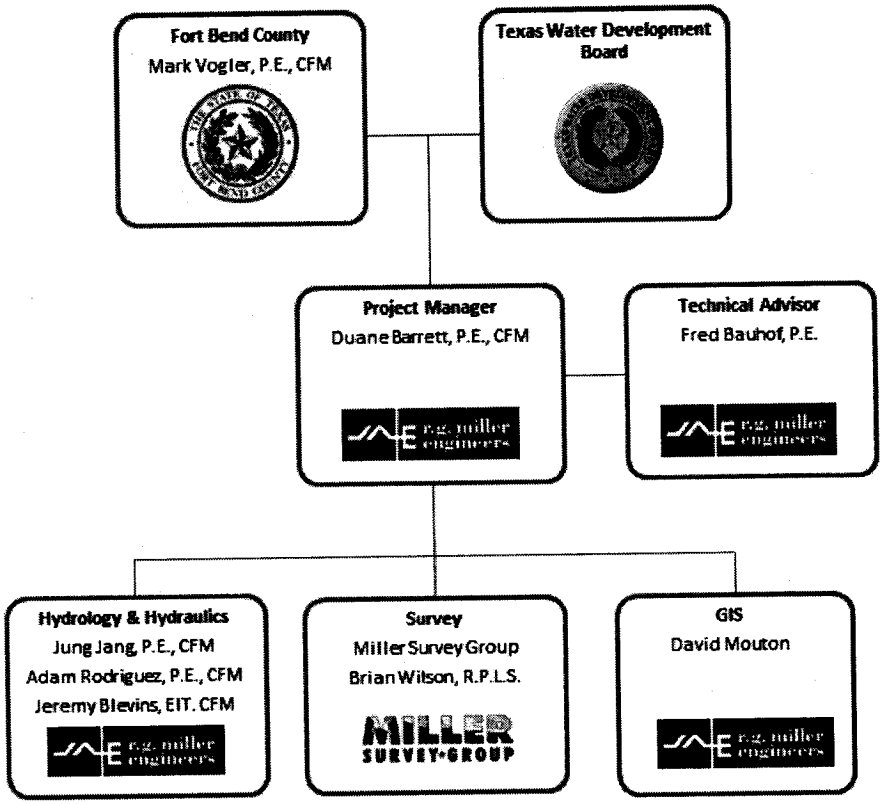
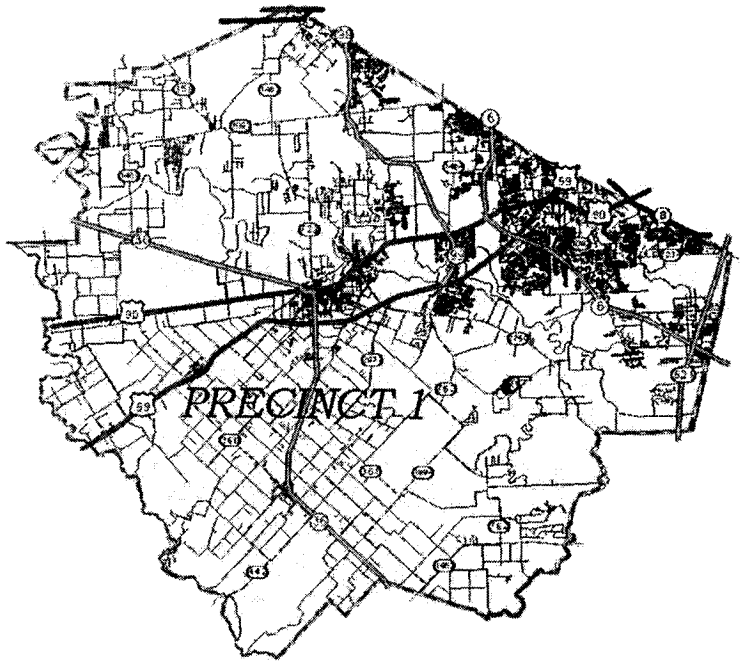


Figure 2: Organizational Chart

APPLICATION FOR FLOOD PROTECTION PLANNING GRANT

Flood Protection Study for the Rabbs Bayou & Gapps Bayou Watersheds
Commissioner Precinct 1, Fort Bend County, Texas



Prepared by
R.G. Miller Engineers, Inc.

January 2011



I. GENERAL INFORMATION

1. *Legal name of applicant(s).*

   Fort Bend County, Texas

2. *Participating political subdivisions.*

   - **Participating / Funding**
     - **Fort Bend County, Texas**
     - **Fort Bend County Drainage District**

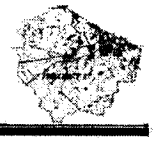
   - **Participating / Non-Funding**
     - **City of Richmond, Texas**
     - **City of Rosenberg, Texas**
     - **City of Sugar Land, Texas**

3. *Authority of law under which each political subdivision was created.*

   - **Fort Bend County was created by the Congress of the Republic of Texas on December 29, 1837. The County has a Judge / Commissioner form of government with a single county judge and four commissioners.**
   - **The Fort Bend County Drainage District was created by Act 1949 of the 61st Legislature of the State of Texas on June 2, 1949. The FBCDD is governed by Fort Bend County Commissioners Court.**
   - **The City of Richmond was created by the Congress of the Republic of Texas in May 1837. The City has a Commissioner / Manager form of government with three commissioners (including the mayor).**
   - **The City of Rosenberg was incorporated in 1902 with a Council / Manager form of government. The City has a mayor and six (6) council members in addition to the city manager.**
   - **The City of Sugar Land was incorporated in 1959. The city has a Council / Manager form of government with a mayor, city manager, and six (6) council members.**

4. *Applicant's official representative, Name, Title, Address, Phone Number, Fax Number, if available E-Mail Address and NFIP ID Number.*

   Mr. Mark Vogler, P.E.
   Fort Bend County Drainage District
   1004 Blume Road
   Rosenberg, TX 77471
   281-342-2863
   voglemar@co.fort-bend.tx.us
   NFIP Community #480228



5. *Citations of applicant's legal authority to plan for and implement flood protection measures for the study watershed or if authority to plan is by inter-local agreement, attach agreement to application.*

   The Legislature of the State of Texas has in the Flood Control Insurance Act, Texas Water Code, Section 16.315, delegated the responsibility of local governmental units to adopt regulations designed to minimize flood losses. Fort Bend County, Texas has established flood damage prevention regulations via its participation in the National Flood Insurance Program, adoption of FEMA minimum standards for floodplain management, the preparation and adoption of the Fort Bend County Drainage Criteria Manual, and the establishment of minimum standards in Fort Bend County platting regulations (specifically Section 4.16 which sets minimum finished floor elevations for new construction). Therefore, the Commissioners' Court of Fort Bend County, Texas does ordain as follows.

   The planning area watersheds lie entirely within the boundaries of Fort Bend County, Texas. All of the communities in which portions of the subject watersheds are located participate in the National Flood Insurance Program (NFIP) as indicated below.

   - **Fort Bend County (NFIP #480228) enrolled in the Regular Phase of the NFIP on March 19, 1987.**
   - **The City of Richmond (NFIP #480231) enrolled in the Regular Phase of the NFIP on January 9, 1987.**
   - **The City of Rosenberg (NFIP #480232) enrolled in the Regular Phase of the NFIP on December 4, 1984.**
   - **The City of Sugar Land (NFIP #480234) enrolled in the Regular Phase of the NFIP on November 4, 1981.**

6. *Is this application in response to a published Request for Proposals listed in the Texas Register?*

   Yes _X_ No ___

7. *If yes to number 6 above, list document number and date of publication.*

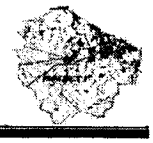
   Texas Register Vol. 35 No. 41
   Published October 8, 2010
   TRD 201005570
   Page No. 9163

8. *Total proposed planning cost.*

   The total proposed planning cost for both watersheds is $300,000. That figure includes study costs, field survey and environmental study costs, and

miscellaneous expenses. Following is a breakdown of proposed study costs for each watershed. Note that these costs do not include budget for field survey or environmental services. The combined planning budget is $231,180. Proposals from Miller Survey Group and Crouch Environmental Services are attached. The total proposed charges for services provided by these sub-contractors are $35,320 and $33,500, respectively. Adding these to the proposed study costs yields a total study budget of $300,000.

BUDGET BREAKDOWN FOR PROPOSED RABBS BAYOU FLOOD PROTECTION STUDY						
Task No.	Task Description	Sr. Project Manager	CAD/GIS Specialist	Project Engineer	Associate Engineer	Admin. Staff
1	Gather and Review Information	2	4	8	8	4
2	Visit the Project Area	8		16	16	
3	Prepare Field Survey Plan	2	4	4	4	
4	Collect Field Survey Data	Miller Survey Group				
5	Complete Environmental Evaluation	Crouch Environmental				
6	Develop Base Hydrologic Model	16	16	64	16	
7	Develop Base Hydraulic Model	16	24	40	80	
8	Map Existing Floodplain & Floodway	4	24	8	8	
9	Prepare Existing Conditions Report	8	16	16	8	8
10	Meet w/ Cities, County, & FBCDD	8		8	8	4
11	Identify Flood Protection Alternatives	8		16	16	
12	Evaluate Flood Protection Alternatives	16	24	40	16	
13	Develop Draft Flood Protection Plan	12	16	16	16	
14	Develop Post-Project Hydrologic Model	4	8	24	12	
15	Develop Post-Project Hydraulic Model	4	8	24	32	
16	Adjust Flood Protection Plan As Needed	12	16	24	16	
17	Prepare Conceptual Phasing Plan	8	12	16	16	
18	Analyze Phasing Plan	8	12	24	16	
19	Prepare Cost Estimates & B/C Ratios	8	8	24	16	
20	Prepare Flood Protection Report	8	16	16	8	16
21	Present Results to Stakeholders	8	2	12	8	8
22	Attend Meetings	40		40	32	8
Sub-Totals		200	210	440	352	48
Hourly Rate		$180	$110	$90	$80	$65
Budget for Individual Personnel		$36,000	$23,100	$39,600	$28,160	$3,120
TOTAL RGME BUDGET REQUIREMENT						$129,980



BUDGET BREAKDOWN FOR PROPOSED GAPPS BAYOU FLOOD PROTECTION STUDY						
Task No.	Task Description	Sr. Project Manager	CAD/GIS Specialist	Project Engineer	Associate Engineer	Admin. Staff
1	Gather and Review Information	2	4	4	2	4
2	Visit the Project Area	8		12	12	
3	Prepare Field Survey Plan	2	4	2	4	
4	Collect Field Survey Data	Miller Survey Group				
5	Complete Environmental Evaluation	Crouch Environmental				
6	Develop Base Hydrologic Model	12	16	48	12	
7	Develop Base Hydraulic Model	12	20	24	56	
8	Map Existing Floodplain & Floodway	4	16	4	6	
9	Prepare Existing Conditions Report	6	12	12	8	8
10	Meet w/ Cities, County, & FBCDD	8		8	8	4
11	Identify Flood Protection Alternatives	6		12	12	
12	Evaluate Flood Protection Alternatives	12	16	40	16	
13	Develop Draft Flood Protection Plan	8	12	16	12	
14	Develop Post-Project Hydrologic Model	4	8	16	8	
15	Develop Post-Project Hydraulic Model	4	8	16	24	
16	Adjust Flood Protection Plan As Needed	8	12	24	12	
17	Prepare Conceptual Phasing Plan	4	8	16	8	
18	Analyze Phasing Plan	4	8	16	12	
19	Prepare Cost Estimates & B/C Ratios	8	8	16	12	
20	Prepare Flood Protection Report	8	12	16	8	8
21	Present Results to Stakeholders	8	2	12	8	8
22	Attend Meetings	32		24	24	8
Sub-Totals		160	166	338	264	40
Hourly Rate		$180	$110	$90	$80	$65
Budget for Individual Personnel		$28,800	$18,260	$30,420	$21,120	$2,600
TOTAL RGME BUDGET REQUIREMENT						$101,200

9. *Total grant funds requested from the Texas Water Development Board.*

   The total grant funds requested from the Texas Water Development Board for both study watersheds is $150,000.

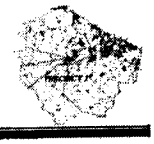
10. *Applicant cash contribution to the study.*

    The applicant cash contribution to the study is $150,000 (50% of the total cost).

11. *Source of cash contribution, explanation of source of local cash contribution, and list of sources.*

    Fort Bend County will provide its share of the study cost from its normal operating funds. The Texas Water Development Board will provide 50% of the funding for the Rabbs Bayou / Gapps Bayou Flood Protection Plan.

12. *Applicant in-kind contribution including a description of in-kind services to be provided.*



Topographic information in the form of LiDAR grid data and contours is currently available for the project area. The following in-kind contributions will be made by study stakeholders.

- **Preliminary or approximate modeling data for each study watershed will be made available by the Fort Bend County Drainage District.**
- **The Fort Bend County Drainage District will provide historical data, first-hand information on local drainage patterns and facilities, and other information as necessary.**
- **Fort Bend County and the Fort Bend County Drainage District will coordinate with the public and will sponsor public meetings.**
- **The Fort Bend County Drainage District will provide project review and management services.**
- **Fort Bend County will provide administrative assistance by planning and coordinating meetings between participating communities and consultants.**

13. *Detailed description of why proposed planning is needed (not to exceed 1 page).*

A new Flood Insurance Study and updated FIRMs for the Brazos River within fort Bend County indicate significant increases in BFE at the confluences of the Brazos with Rabbs Bayou and Gapps Bayou. A number of existing levees were upgraded and new levees were constructed in some areas, but no new flood protection measures have been constructed that benefit either Rabbs or Gapps Bayous. The 1% annual chance flood level in the Brazos would, if projected horizontally upstream along Rabbs Bayou, inundate significant areas north of the bayou. Even a 10% to 20% annual chance (10-year to 5-year) flood occurring coincidentally with a 1% chance flood on the Brazos River would severely impact significant areas along Rabbs Bayou, especially the valley of Middle Bayou, a tributary to Rabbs Bayou.

The Lakes at Williams Ranch and Canyon Lakes at the Brazos occupy portions of the valley of Middle Bayou and are at risk in terms of flooding during heavy rainfall events. A significant number of existing homes are located within the area potentially affected by flooding during heavy local rainfall events and/or flooding along the Brazos River.

Neither of these watersheds has been studied in detail in connection with the Fort Bend County Flood Insurance Study. Thus, existing flood hazards have not been identified, and local residents may be unaware of the potential for flooding in the area. Property owners who should have flood insurance may actually be uninsured.

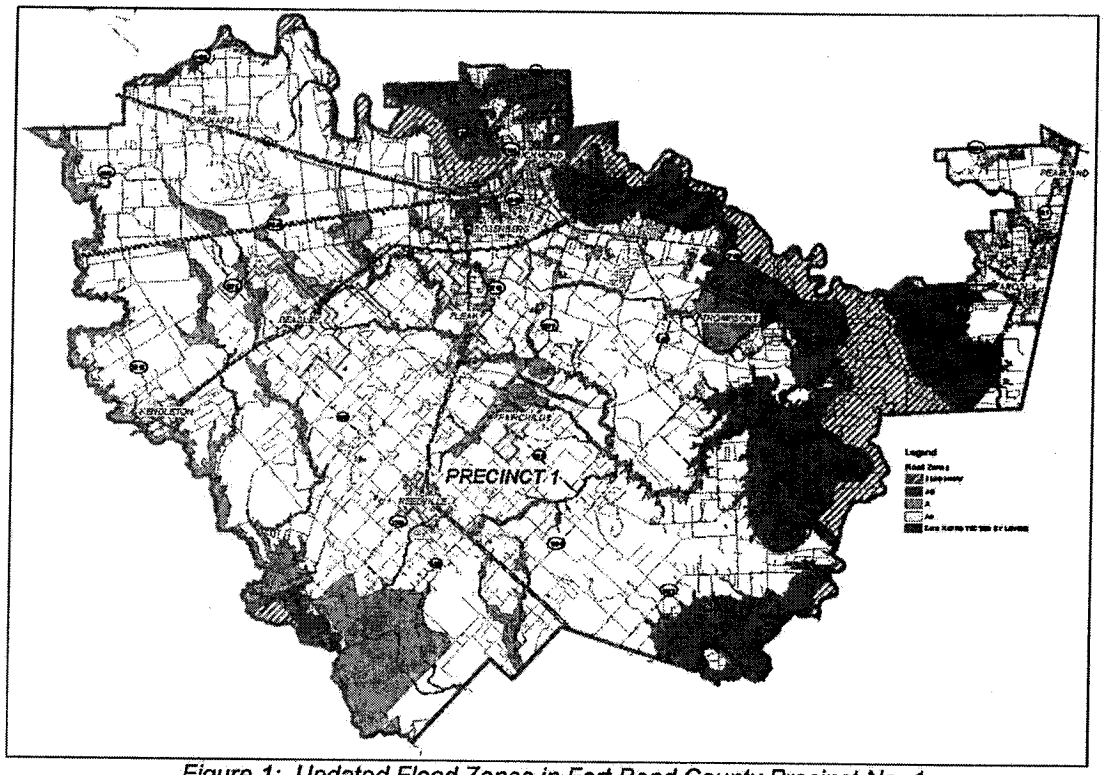
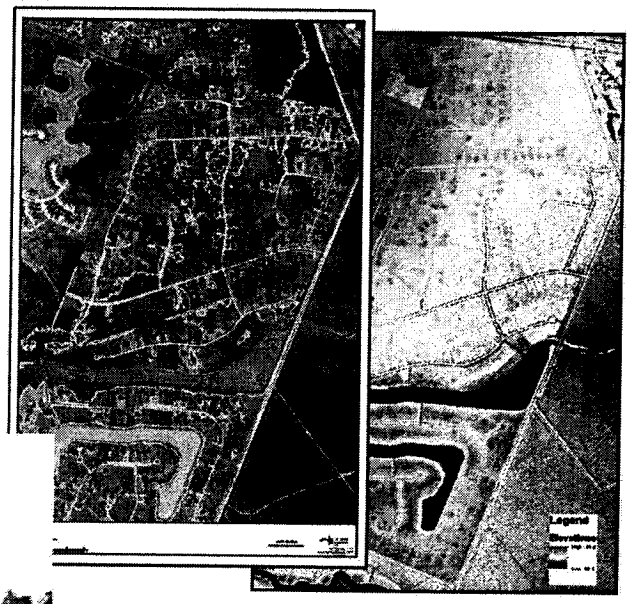


Figure 1: Updated Flood Zones in Fort Bend County Precinct No. 1

The Bridlewood subdivision, located in the central portion of the Gapps Bayou watershed, has experienced flooding problems for a number of years. Approximate modeling data recently developed for Gapps Bayou by local engineering firm Edminster, Hinshaw, Russ & Stanley indicates that the Bridlewood subdivision would be severely affected during a 1% annual chance flood.



Figures 2 & 3 (Above): Approximate 1% Floodplan Boundary and Color-Shaded Relief Map of the Bridlewood Area



Exacerbating local flooding is the fact

Photo (Left): Flooding in the Bridlewood subdivision in 1998.

that ground subsidence due to long-term extraction of groundwater in the region has reduced ground elevations and increased flooding potential. This phenomenon has adversely affected the entire Houston area, including Fort Bend County.

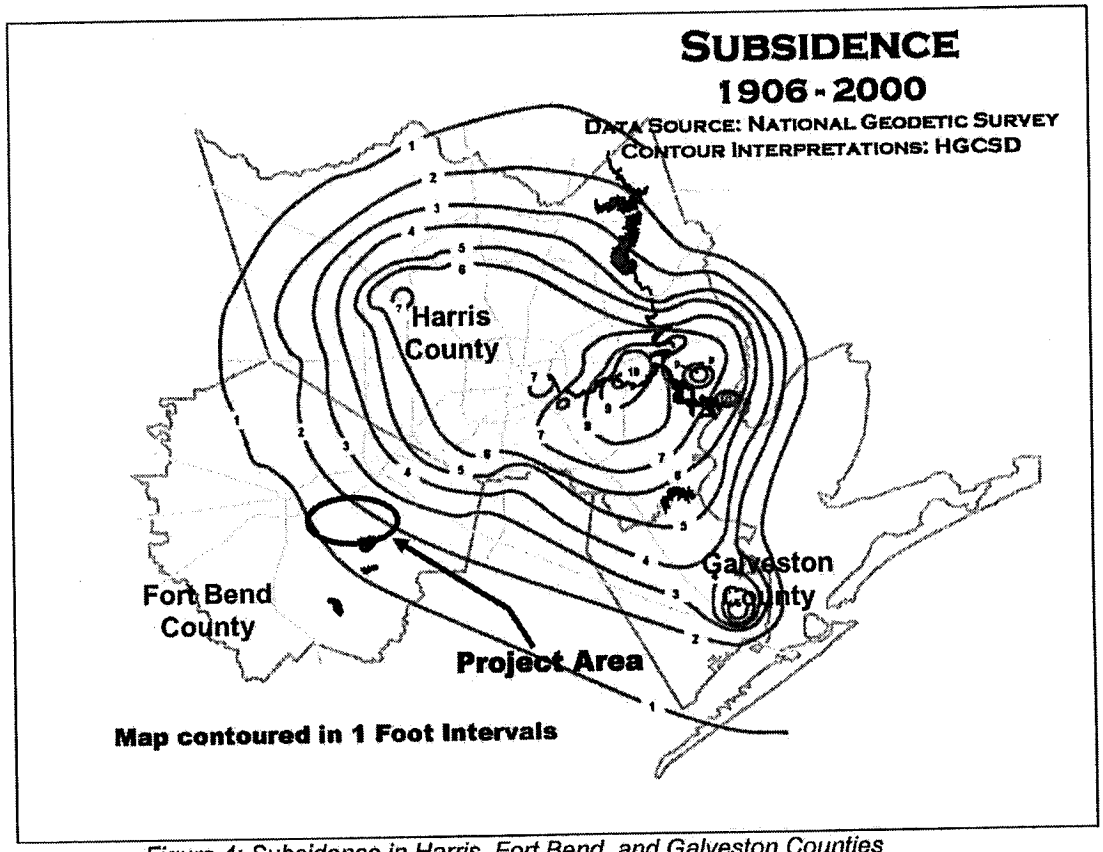
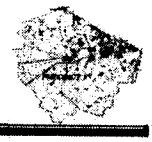


Figure 4: Subsidence in Harris, Fort Bend, and Galveston Counties

No overall flooding study or master drainage plan has been completed for either Rabbs Bayou or Gapps Bayou since 1989. However, urbanization is proceeding at a rapid pace in both of the subject watersheds. Drainage studies are prepared in piecemeal fashion for individual developments, and there is no clearly defined overall flood protection plan that developers and engineers may use to ensure that new developments are properly protected and that existing developments are not adversely affected by new development.

14. *Detailed description of why state funding assistance is needed (not to exceed 1 page).*

Precinct 1 is by far the largest precinct in Fort Bend County in terms of area. The overall population density is, however, lower in Precinct 1 than in other precincts, limiting the tax base and available revenues for flood protection studies. In addition, the poor state of the economy has reduced revenues to the County government. Finally, recent expenditures on flood studies for the Brazos River



and major tributaries have exhausted local flood protection planning funds that might otherwise be available for studies of the Rabbs Bayou and/or Gapps Bayou watersheds.

15. *Identify potential sources and amounts of funding available for implementation of viable flood protection measures resulting from proposed planning.*

The following potential sources of funding have been identified for possible implementation of flood protection measures identified in connection with the proposed planning.

- **General Tax Revenues**
- **Bond Sales**
- **FEMA Flood Mitigation Assistance Program**
- **FEMA Severe Repetitive Loss Grant Program**
- **Brazos River Authority**
- **HUD Funds for Low-Income Areas**
- **TxDOT Project Funding**
- **NRCS Project Funding**
- **Texas Parks & Wildlife Funding for Parks, Etc.**
- **Development Impact Fees**

II. PLANNING INFORMATION

1. *Describe the geographical planning area (specify river basins, counties, cities, districts, etc. and provide explanation for selecting planning boundaries). Not to exceed 1 page.*

The proposed planning area includes both the Rabbs Bayou and Gapps Bayou (aka Gapps Slough) watersheds. The Rabbs Bayou watershed covers a total area of approximately 6,790 acres (10.6 square miles). The Gapps Bayou watershed covers a total area of approximately 5,060 acres (7.9 square miles). The combined area of the adjacent watersheds is 18.5 square miles.

Most of each watershed lies within unincorporated areas of Fort Bend County, Texas. A portion of the Gapps Bayou watershed lies within the incorporated boundary of the City of Rosenberg, Texas. Portions of the Rabbs Bayou watershed lie within the Cities of Richmond and Sugar Land, Texas.

Both watersheds are partially developed. Subdivisions located within the Rabbs Bayou watershed include Canyon Lakes at the Brazos, Lakes at Williams Ranch, Greatwood, Brazos Town Center, Tara, and the Villages of Rosenberg. Subdivisions located within the Gapps Bayou watershed include Summer Lakes, Summer Creek, Bridlewood Estates, Royal Lakes Estates, Rivers Mist, and River Run at the Brazos.

These planning boundaries were selected primarily on the basis of need. Recent changes in 1% annual chance flood elevations along the Brazos River and the development of modeling data for the Rabbs Bayou and Gapps Bayou watersheds indicate that existing developments will likely be affected by flooding during extreme events, especially when the Brazos is at flood stage. The selection of

these particular watersheds for study was supported by representatives of the Fort Bend County Drainage District and Fort Bend County Precinct 1.

2. *A map of the planning area.*

Figure 5 is a map of the Rabbs Bayou & Gapps Bayou watersheds with the boundaries of all incorporated areas that lie within either watershed.

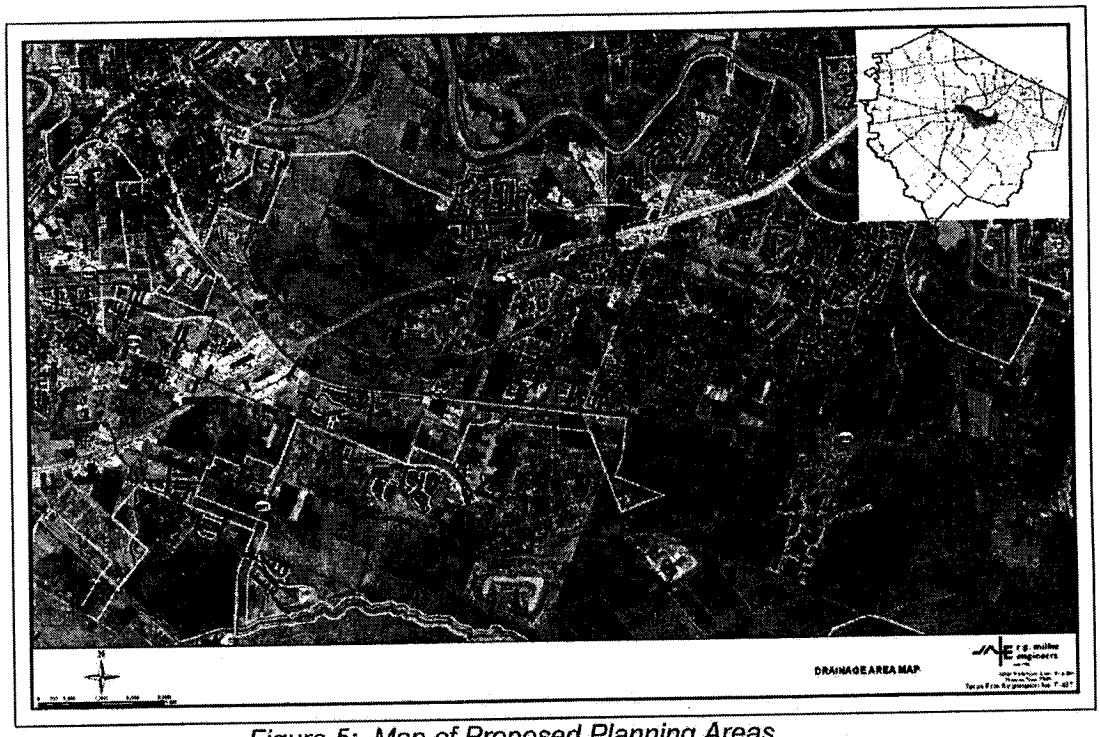


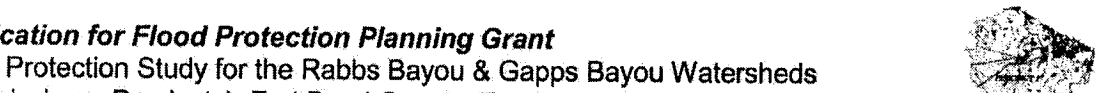
Figure 5: Map of Proposed Planning Areas

3. *A description of the existing or potential flood hazard that this planning is intended to address and the way in which the proposed planning will address the problem.*

A recent hydraulic model prepared by Edminister Hinshaw Stanley & Russ, Inc. indicates that 1% annual chance flood levels will reach approximately 78.5 feet upstream of FM 762. At that elevation, a significant portion of the Bridlewood subdivision will be flooded. The approximate extent of flooding is indicated on Figure 6. Potential overflows to the Dry Creek watershed are possible at the predicted 1% annual chance flood level.

The updated 1% annual chance flood elevation at the confluence of the Brazos River with Rabbs Bayou is 73.5 feet. That elevation projected horizontally upstream along Rabbs Bayou produces the approximate floodplain boundary indicated on Figure 7.

Approximately 130 existing structures in the Rabbs Bayou and Gapps Bayou watershed are at risk of flooding during a 1% annual chance event. The estimated number of people affected by flooding in the approximate flood zones indicated



on Figures 6 and 7 is 446. The estimated value of the homes potentially affected by flooding is $14,963,000.

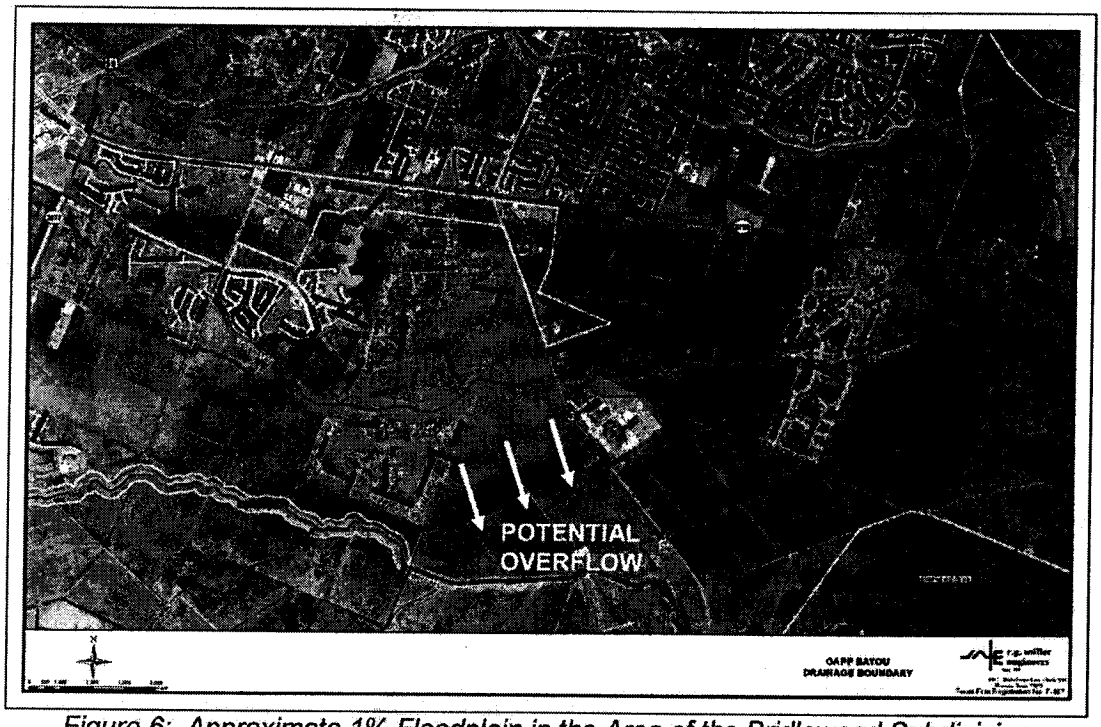


Figure 6: Approximate 1% Floodplain in the Area of the Bridlewood Subdivision

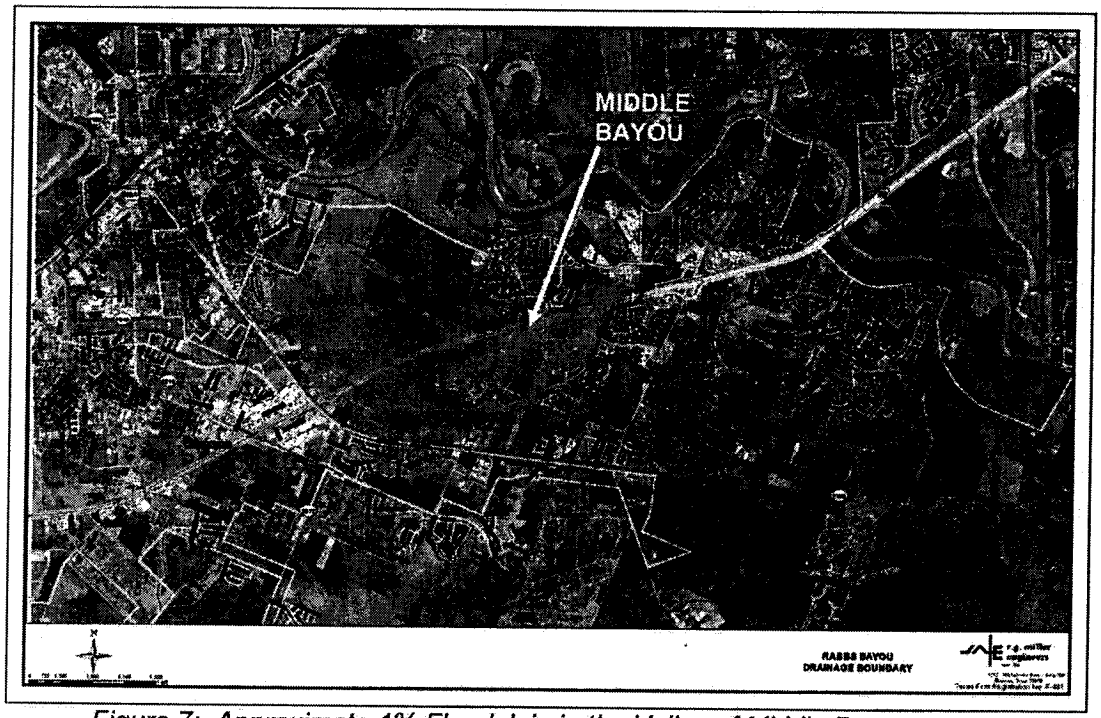


Figure 7: Approximate 1% Floodplain in the Valley of Middle Bayou



The proposed study will provide floodplain and floodway elevation data as well as mapping information for the Rabbs Bayou and Gapps Bayou watersheds. This information will allow local officials to regulate development in such a way as to minimize the potential for flood damages. The proposed flood protection plan will provide data from the mouth of each stream to a point at which the watershed area is 1.0 square mile. The proposed flood protection planning study will involve the following elements.

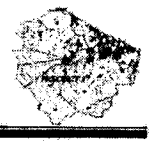
- **Field survey of existing stream channels to provide a sufficient degree of detail for accurate modeling and reliable flood level prediction.**
- **Hydrologic modeling of each candidate watershed using the Hydrologic Modeling System software developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers (HEC-HMS).**
- **Hydraulic modeling of each stream using the River Analysis System software developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers (HEC-RAS).**
- **Preparation of a complete, detailed study report for each watershed to fully summarize the data, methods, and assumptions used in each study and the results obtained.**
- **A regional drainage plan for each watershed with recommended improvements, phasing plans, and funding options.**
- **Funding options will be evaluated in detail, and all possible means of securing funding for recommended drainage improvements will be explored**

4. *A description of historical flooding and flood damage in the proposed planning area.*

The following summary of flooding in Fort Bend County is provided in the draft Flood Insurance Study issued in 2010.

"Reports on historic flooding show that major storms or floods in the area occurred in 1899, 1900, 1913, 1915, and 1929. The flood of 1899 and the storm of 1900 caused much damage to Fort Bend County. Crops, livestock, and lives were lost during these two events. The City of Richmond suffered some of the greater losses. Four to five feet of water was seen for several days, and in some places for a stretch of land seven miles wide. The floods of 1913 and 1929 left water covering large portions of the Cities of Rosenberg and Richmond. It was reported that during the 1913 flood, the waters of the Brazos, San Bernard, and Colorado Rivers met below Rosenberg.

The 1991 flooding event caused by heavy rains from the Gulf of Mexico storm was one of the largest rainfall totals in Texas recorded history. Downstream, the Brazos River and Oyster Creek merged as the Brazos River flowed over the left floodplain near Harris Reservoir. Residential flooding was widespread above in Simonton to the Gulf in Fort Bend and Brazoria Counties.



The October 1994 floods were the deadliest Southeast Texas weather event since 1983's Hurricane Alicia. Heavy rains began falling late afternoon on the 16th across Burleson, Brazos, Grimes and Washington Counties. On the night of the 17th and 18th rains continued to slide further south and began affecting people in Jackson, Wharton, Matagorda, Brazoria, and portions of Fort Bend counties. Total rainfall from the entire storm generally ranged from 10 to 20 inches with Liberty recording 30.50 inches during the storm. Over 13,000 people had to be evacuated during the floods and over 22,000 homes received flood damage. Total damage to homes and businesses was approximately $800 million while another $100 million was done to roads and bridges throughout Southeast Texas.

On October 18, 1998, a series of storms moved across the central and south regions of Texas, dropping up to 22 inches of rain in some areas and spawning several tornados. Sixty Texas counties (24%) reported flooding during October 17-19. Thirty-six counties, including Fort Bend County, became eligible for federal and/or state assistance as a result of damages suffered from this storm system during October 17-31. Estimated flood damage was approximately $900 million, including damage to 12,000 homes, 700 businesses, and public property."

- **Brazos River flood stages recorded at Rosharon, Texas are summarized below. The flood stage at the Rosharon gage is 43 feet.**

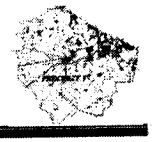
  (1) 56.40 ft on 12/11/1913
  (2) 53.40 ft on 05/07/1957
  (3) 52.00 ft on 05/01/1965
  (4) 51.89 ft on 01/03/1992
  (5) 51.82 ft on 10/22/1994
  (6) 50.74 ft on 05/14/1968
  (7) 50.67 ft on 02/10/1992
  (8) 49.22 ft on 11/17/1998
  (9) 48.83 ft on 10/24/1998
  (10) 48.80 ft on 11/29/2004

- **The Advanced Hydrologic Prediction Service (AHPS) of the National Weather Service indicates that the following flood stages were recorded at Richmond, Texas from 1992 through 1998. The flood stage at the Richmond gage is 48 feet.**

  (1) 50.30 ft on 10/21/1994
  (2) 49.80 ft on 01/01/1992
  (3) 48.93 ft on 10/23/1998
  (4) 47.38 ft on 03/01/1992
  (5) 47.15 ft on 01/31/1992

5. *A description of how the planning will address public safety and welfare (not to exceed 1 page).*

Flooding within the proposed study areas affects roadways and transportation. Flooded roadways present a real danger to area residents. Structural flooding is possible in currently developed areas. Flat terrain and subsidence contribute to



flooding over large areas. As indicated in the attached petition from residents of the Bridlewood Estates subdivision, poor drainage creates significant problems with roadways as well as conditions favorable for mosquito breeding. Water, wastewater, and other utilities are adversely affected by flooding events, which interrupt power and reduce treatment efficiency. The following bullet points illustrate ways in which the proposed planning effort will address public safety and welfare.

- **Flood protection plans developed via the proposed study effort will directly reduce structural flooding via lower flooding levels and/or protection provided to developed regions via levees or other measures.**
- **Flooding of roadways will be reduced via lower flood levels and/or increased pavement elevations.**
- **Updated flood levels and mapping information will allow improved regulation by Fort Bend County within areas affected by flooding.**
- **Improved drainage will result in reduced risk of mosquito-borne diseases and other hazards associated with stagnant water.**
- **Improved drainage and reduced flood levels will minimize adverse impacts to water, wastewater, and other utilities, decrease down time during extreme storm events, and reduce risks associated with untreated wastewater and unsafe drinking water.**

6. *Current unemployment rate in the proposed planning area.*

   Texas Workforce Commission Data for 2009 indicates 7.2% unemployment for Fort Bend County (Texas County Information Project).

7. *Current per-capita income in the proposed planning area.*

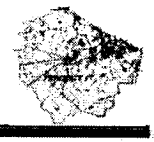
   Per-capita income for Fort Bend County in 2008 was $44,265, according to the Texas Workforce Commission.

8. *Current population in the proposed planning area.*

   U.S. Census Bureau, 2009 Estimates
   - Fort Bend County: 556,870
   - City of Richmond: 13,532
   - City of Rosenberg: 33,962
   - City of Sugar Land: 81,725

9. *Current population residing in the 100-year floodplain in the planning area.*

   - **Persons Per Housing Unit = 556,870 / 162,589 = 3.43**
   - **No. of Housing Units in 100-year Floodplain = 130**
   - **Estimated Population in 100-Year Floodplain = 130 x 3.43 = 446**



10. Estimated value of property in the 100-year floodplain in the planning area.

- **Median Value of Housing Unit in Fort Bend County = $115,100 (2000)**
- **Estimated No. of Housing Units in 100-year Floodplain = 130**
- **Estimated Value of Property in 100-Year Floodplain = 130 x $115,100**
  = $14,963,000

11. Number of National Flood Insurance Program policies in effect in the proposed planning area.

The following table summarizes the number of NFIP policies in effect within the general planning area, along with total coverage, premium costs, claims, and payments.

Jurisdiction	Richmond	Rosenberg	Sugar Land	Fort Bend Co.
Policies	398	720	3,783	13,517
Coverage	$101,043,700	$153,881,600	$1,123,086,000	$4,185,023,800
Premiums	$148,900	$323,765	$1,371,224	$5,029,910
Claims	33	46	188	260
Payments	$341,361	$437,848	$697,678	$3,417,084

Source: Federal Emergency Management Agency

12. Method for determination of potential cost effectiveness of proposed flood protection solutions.

The frequency and severity of flooding will be assessed using hydrologic and hydraulic models developed for each watershed. Storm events ranging from a 2-year to a 100-year frequency (50% to 1% annual probability) will be analyzed to produce the flood data necessary for the analysis. The results obtained using these models will be used to identify potential damages to homes, businesses, and public infrastructure. An estimate of annual damages will be developed and compared with the potential annual benefits associated with various flood protection alternatives. The annualized costs and benefits of each alternative will be assessed using HEC-FDA, FEMA's Benefit Cost Analysis software, or other appropriate tool.

13. The date(s) and description(s) of the most recent flood protection planning in the proposed planning area.

The last official FIRM update for Fort Bend County was completed in 1997, but neither watershed mapped in detail. Preliminary new FIRMs for Fort Bend County were released for public review and comment on July 21, 2010. The comment period closed in October 2010, and appeals filed during the comment period are now being processed.

The last flood protection planning effort for the Rabbs Bayou watershed was completed in 1989. No comprehensive flood protection planning effort has ever been completed for the Gapps Bayou watershed. Piecemeal studies have completed in connection with individual developments, but those studies are not comprehensive.



14. A description of how the proposed planning will coordinate with other flood protection plans or facilities in the planning area, surrounding regions, and the State.

Levees in the area protect several regions adjacent to the study area from flooding. The various levee improvement districts will be consulted in connection with the proposed study effort. Tie-ins to existing levees are possible. Existing development in at-risk areas will be brought into compliance with Fort Bend County regulations regarding flood protection. Drainage plans for existing developments will be incorporated into overall watershed plans, with modifications made as needed. Other state and local agencies, including TxDOT, TCEQ, the Brazos River Authority, the Fort Bend County Drainage District, and TWDB, will be consulted regarding existing streams and drainage facilities as well as proposed drainage improvements.

15. A detailed scope of work for proposed planning.

The following scope of work describes the major tasks that will be undertaken and completed in connection with the proposed flood protection planning study.

1. **Gather and Review Information:** Gather and review information on each of the proposed study watersheds.

2. **Visit the Project Area:** Visit key locations within each of the subject watersheds to obtain information on existing drainage patterns and facilities.

3. **Prepare Field Survey Plan:** Prepare a detailed plan for obtaining field survey data along Rabbs Bayou and Gapps Bayou, including channel cross-sections as well as information on bridges and culverts.

4. **Collect Field Survey Data:** Collect survey data in the field, ensuring that all data points are geo-referenced and tied to the latest vertical and horizontal datums.

5. **Complete Environmental Evaluation:** Complete an environmental evaluation of each study watershed, identifying sensitive areas that should be avoided or for which mitigation may be required if disturbed.

6. **Develop Base Hydrologic Model:** Develop a base (current conditions) hydrologic model of each study watershed using the HEC-HMS software package. Use methods described in the Fort Bend County Drainage Criteria Manual to develop modeling data. Compute base conditions flow rates for 10-year, 50-year, 100-year, and 500-year storm events.

7. **Develop Base Hydraulic Model:** Develop a base (current conditions) hydraulic model of each study stream using the HEC-RAS software package. Use field survey data, LiDAR elevation data, and information obtained during field visits to develop the hydraulic modeling data. Compute base conditions flood levels for 10-year, 50-year, 100-year, and 500-year storm events, as well as floodway data.



8. **Map Existing Floodplain & Floodway:** Map existing conditions floodplain and floodway boundaries in accordance with FEMA mapping methods and requirements.

9. **Prepare Existing Conditions Report:** Prepare a report that details existing drainage conditions within the subject watersheds.

10. **Meet w/ Cities, County, & FBCDD:** Meet with representatives of participating cities, Fort Bend County, and the Fort Bend County Drainage District to discuss the results of the existing conditions study effort.

11. **Identify Flood Protection Alternatives:** Identify potential flood protection strategies and alternatives for each study watershed, including both structural and non-structural measures.

12. **Evaluate Flood Protection Alternatives:** Evaluate and prioritize potential flood protection alternatives in relative order of anticipated cost-effectiveness.

13. **Develop Draft Flood Protection Plan:** Develop a preliminary flood protection plan that incorporates the most cost-effective alternatives for each study watershed.

14. **Develop Post-Project Hydrologic Model:** Prepare a post-project hydrologic model for each watershed to reflect the implementation of selected flood protection alternatives. Compute post-project conditions flow rates.

15. **Develop Post-Project Hydraulic Model:** Prepare a post-project hydrologic model for each watershed to reflect the implementation of selected flood protection alternatives. Compute post-project conditions flood levels.

16. **Adjust Flood Protection Plan As Needed:** Adjust the flood protection plan as needed, making necessary changes to post-project conditions hydrologic and hydraulic models. Compute final post-project conditions flood flow rates, flood elevations, and floodway data.

17. **Prepare Conceptual Phasing Plan:** Prepare a conceptual phasing plan for each watershed to allow flood protection measures to be implemented in a fiscally responsible manner.

18. **Analyze Phasing Plan:** Create interim conditions hydrologic and hydraulic models that represent significant milestones in the phasing plan for each watershed. Adjust phasing plans as needed to maximize performance and anticipated cost-effectiveness.

19. **Prepare Cost Estimates & B/C Ratios:** Develop preliminary cost estimates for each watershed to include both interim and fully-implemented flood protection plans. Analyze the potential annual benefits and costs associated with the proposed plans.

20. **Prepare Flood Protection Report:** Prepare a report that describes proposed flood protection measures, phasing plans, and post -project drainage conditions within the subject watersheds.

21. **Present Results to Cities, County, FBCDD:** Present the results of the studies to representatives of participating cities, the Fort Bend County Drainage District, and Fort Bend County.

22. **Attend Meetings:** Attend regular monthly meetings with study stakeholders, in addition to public meetings held in an effort to .

16. Task Budget for Detailed Scope.

Following is a breakdown of the budget established for each of the tasks included in the scope of work.

BUDGET ESTIMATE BY TASK			
Task No.	Task Description	Task Budgets	
		Rabbs Bayou	Gapps Bayou
1	Gather and Review Information	$2,420	$1,580
2	Visit the Project Area	$4,160	$3,480
3	Prepare Field Survey Plan	$1,480	$1,300
4	Collect Field Survey Data	$20,520	$14,800
5	Complete Environmental Evaluation	$19,500	$14,000
6	Develop Base Hydrologic Model	$11,680	$9,200
7	Develop Base Hydraulic Model	$15,520	$11,000
8	Map Existing Floodplain & Floodway	$4,720	$3,320
9	Prepare Existing Conditions Report	$5,800	$4,640
10	Meet w/ Cities, County, & FBCDD	$3,060	$3,060
11	Identify Flood Protection Alternatives	$4,160	$3,120
12	Evaluate Flood Protection Alternatives	$10,400	$8,800
13	Develop Draft Flood Protection Plan	$6,640	$5,160
14	Develop Post-Project Hydrologic Model	$4,720	$3,680
15	Develop Post-Project Hydraulic Model	$6,320	$4,960
16	Adjust Flood Protection Plan As Needed	$7,360	$5,880
17	Prepare Conceptual Phasing Plan	$5,480	$3,680
18	Analyze Phasing Plan	$6,200	$4,000
19	Prepare Cost Estimates & B/C Ratios	$5,760	$4,720
20	Prepare Flood Protection Report	$6,320	$5,360
21	Present Results to Cities, County, FBCDD	$3,900	$3,900
22	Attend Meetings	$13,880	$10,360
Sub-Totals		**$170,000**	**$130,000**
Overall Total			**$300,000**

17. Proposed Project Schedule (Dependent on contract execution date).

The total proposed contract execution time is 12 months. A preliminary schedule follows.

PROJECT SCHEDULE
FORT BEND COUNTY PRECINCT ONE
RABBS BAYOU & GAPPS BAYOU WATERSHEDS
FLOOD PROTECTION PLANNING GRANT APPLICATION

TASK COMPLETION MILESTONES FOR GIVEN MONTH FROM PROJECT INITIATION													
Task No.	Task Description	1	2	3	4	5	6	7	8	9	10	11	12
PROJECT MANAGEMENT & COORDINATION													
	Overall Project Direction & Management												
	Public Hearings												
	Prepare Reports, Invoices, Etc.												
ACTUAL PROJECT TASKS													
1	Gather and Review Information												
2	Visit the Project Area												
3	Prepare Field Survey Plan												
4	Collect Field Survey Data												
5	Complete Environmental Evaluation												
6	Develop Base Hydrologic Model												
7	Develop Base Hydraulic Model												
8	Map Existing Floodplain & Floodway												
9	Prepare Existing Conditions Report												
10	Meet w/ Cities, County, & FBCDD												
11	Identify Flood Protection Alternatives												
12	Evaluate Flood Protection Alternatives												
13	Develop Draft Flood Protection Plan												
14	Develop Post-Project Hydrologic Model												
15	Develop Post-Project Hydraulic Model												
16	Adjust Flood Protection Plan As Needed												
17	Prepare Conceptual Phasing Plan												
18	Analyze Phasing Plan												
19	Prepare Cost Estimates												
20	Prepare Flood Protection Report												
21	Present Results to Cities, County, FBCDD												
22	Attend Regular Monthly Meetings												

18. An expense budget by category for detailed scope of work.

An expense budget for the proposed study follows. Proposals provided by Miller Survey Group and Crouch Environmental Services, Inc. for field survey and environmental work are attached.



EXPENSE BUDGET
FORT BEND COUNTY PRECINCT ONE
RABBS BAYOU & GAPPS BAYOU WATERSHEDS
FLOOD PROTECTION PLANNING GRANT APPLICATION

Item No.	Category	Consultant	Total Budget
1	Salaries	$71,650	$71,650
2	Travel	$1,500	$1,500
3	Communication	$300	$300
4	Supplies	$250	$250
5	Tech/Computer	$300	$300
6	Reproduction	$1,750	$1,750
7	Subcontractor (Miller Survey Group)	$35,320	$35,320
8	Subcontractor (Crouch Environmental)	$33,500	$33,500
9	Benefits	$19,350	$19,350
10	Profit	$7,100	$7,100
11	Overhead / G&A	$128,980	$128,980
TOTALS		**$300,000**	**$300,000**

19. Qualifications and direct experience of proposed project staff.

The following personnel will be involved in the proposed study. A resume for each individual is attached to this application.

- **Duane Barrett, P.E., CFM – Project Manager**
- **Fred Bauhof, P.E. – Technical Advisor**
- **Jung P. Jang, P.E., CFM – Project Engineer**
- **Adam Rodriguez, P.E., CFM – Project Engineer**
- **Jeremy Blevins, E.I.T., CFM – Associate Engineer**
- **David Mouton – GIS/CAD Specialist**
- **Brian Wilson, R.P.L.S. – Field Survey Manager**
- **Gregory E. Crouch –Environmental Consultant**

The organizational chart below illustrates the general relationships between the various agencies, companies, and individuals proposed to be involved in the project.

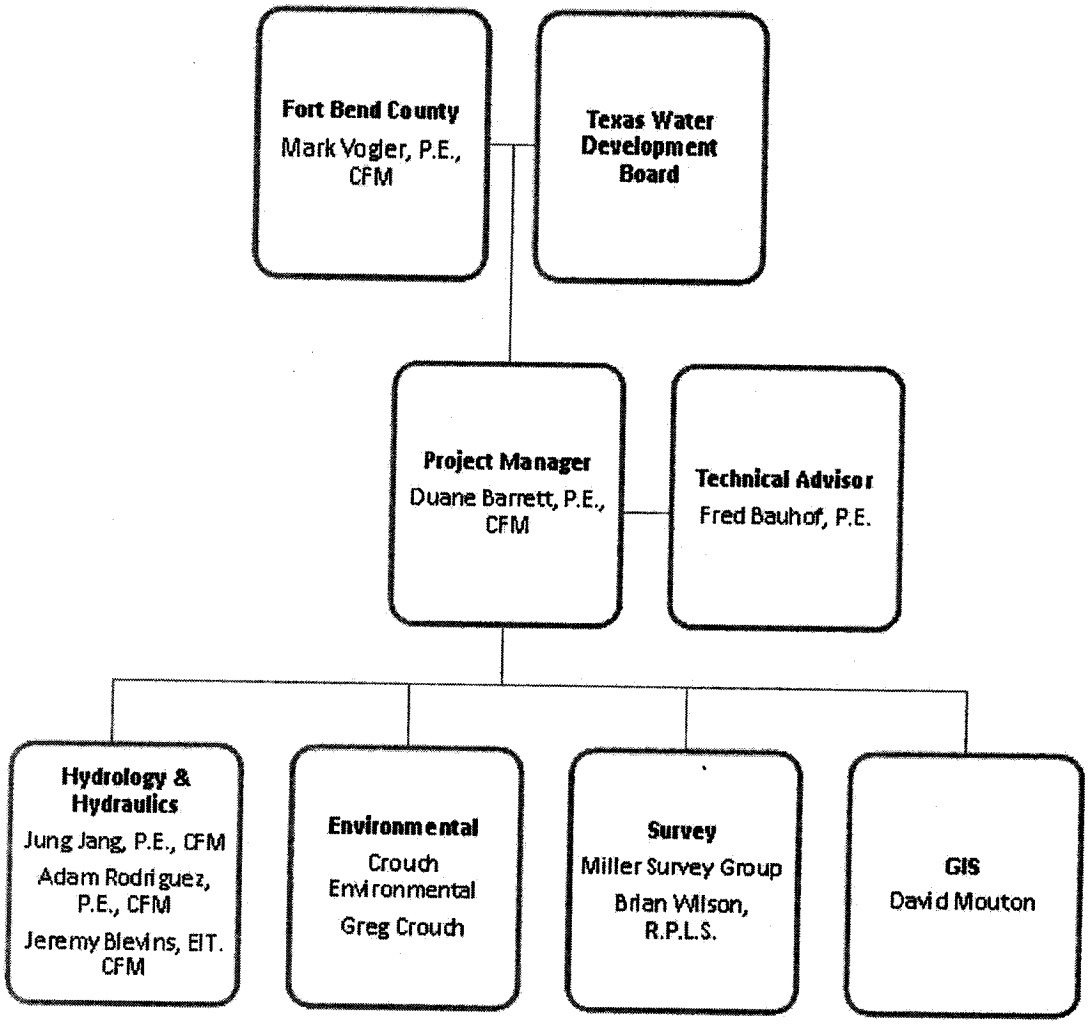


Figure 8: Organizational Chart

20. *Identify the watershed(s) for which flood protection needs will be addressed.*

- **Rabbs Bayou**
- **Gapps Bayou**

21. *A description of how flood protection needs of the entire watershed will be considered* (not to exceed 2 pages).

Hydrologic modeling efforts will include the entirety of each watershed. LiDAR data, which is currently available for the entirety of each study watershed, will allow flooding patterns to be assessed in detail throughout each watershed. Flood levels will be computed, and floodplain boundaries will be mapped, from the mouth of each stream to a point at which the drainage area is 1.0 square mile or less. Floodplain boundaries will be mapped for all political entities with no special



consideration given to any one particular entity. Flood protection needs will be assessed on the basis of flood frequency, flooding depth, and potential damages to homes, businesses, and public infrastructure, no matter the location within each watershed.

22. *Method of monitoring study progress.*

A detailed scope of work has been developed for the study, along with a preliminary project schedule. Easily identifiable and clearly defined milestones will be established and linked to the project schedule. The FBCDD will provide local control and review of the scope and schedule. Monthly status meetings will be held with Fort Bend County, the FBCDD, involved cities, and the TWDB. A monthly status report will be prepared for each meeting.

ATTACHMENTS

1. **Resolution Passed by Fort Bend County Commissioners' Court**
2. **Assurance Letter to Texas Water Development Board**
3. **Copies of Notification Letters Sent to Local Political Subdivisions (with Receipts)**
4. **Slides from PowerPoint® Presentation on Fort Bend County**
5. **Fort Bend County Information from County Web Site & Other Sources**
6. **Summaries of Past Study Efforts in the Gapps Bayou and Rabbs Bayou Watersheds**
7. **Information on Past Flooding in the General Project Area**
8. **Petition from Residents of Bridlewood Estates Sections 1 – 4**
9. **Flooding Photos for the Bridlewood Estates Subdivision**
10. **Maps and Exhibits for the Proposed Project Area**
11. **Resumes for Key Study Personnel**
12. **Proposals from Proposed Survey and Environmental Sub-Contractors**

ATTACHMENT 1

RESOLUTION

Passed by Fort Bend County Commissioner's Court

r. g. miller engineers

RESOLUTION

RESOLUTION AUTHORIZING FORT BEND COUNTY, TEXAS

APPLICATION FOR FLOOD PROTECTION GRANT ASSISTANCE

WITH THE TEXAS WATER DEVELOPMENT BOARD.

WHEREAS, Fort Bend County, Texas desires to develop a Flood Protection Study for Rabbs Bayou and Gapps Bayou, both of which drain into the Brazos River;

WHEREAS, Fort Bend County, Texas, ensures that the proposed planning does not duplicate existing projects with the exception of updating existing flood protection plans;

WHEREAS, Fort Bend County, Texas, will appropriate matching funds and in-kind services, if the grant is awarded, to assist with the financing of the Flood Protection Study;

WHEREAS, Fort Bend County, Texas, will attempt to pursue implementation of viable solutions identified through the proposed planning effort and will pursue and identify potential sources of funding for implementation of viable solutions;

WHEREAS, Fort Bend County as well as many of the cities of Fort Bend County, Texas, are currently participating in the National Flood Insurance Program making flood insurance available for all insurable structures in their respective incorporated and unincorporated areas; and

WHEREAS, this Resolution serves a public purpose.

THEREFORE, BE IT RESOLVED that the Commissioner's Court of Fort Bend County, Texas authorizes this application to the Texas Water Development Board for flood protection planning grant assistance.

PASSED AND APPROVED by the County of Fort Bend Commissioner's Court on this the 11th day of January, 2011.

The Honorable Judge Robert Hebert

ATTEST:

Dianne Wilson, County Clerk

COMMISSIONERS COURT FORT BEND COUNTY, TEXAS STATE OF TEXAS

I/MTR/Resolutions/01.07.2011 File No._____

ATTACHMENT 2

ASSURANCE LETTER

To Texas Water Development Board

r.g. miller
engineers

DRAINAGE DISTRICT

Fort Bend County, Texas

January 4, 2011

Mr. Kevin Ward, Executive Administrator
Texas Water Development Board
1700 North Congress Avenue
Austin, Texas 78711-3231

Re: Grant Application Written Assurances

Dear Mr. Ward;

As the engineer for the Fort Bend County Drainage District I want to assure you of the following:

1. The proposed planning study does not duplicate existing projects. Our goal is to improve the base data and modeling information of Rabbs Bayou and Gapps Slough watershed while addressing public safety and welfare issues;

2. The implementation of viable solutions identified through the proposed planning and identification of potential sources of funding for implementation of viable solutions will be diligently pursued;

3. If a grant is awarded, local matching funds and in-kind services will be available for the proposed planning, and will be provided when the contract is executed;

4. Fort Bend County is a participant in the National Flood Insurance Program.

Sincerely,

Mark Vogler

Mark Vogler
Fort Bend County Drainage District

ATTACHMENT 3

NOTIFICATION LETTERS

Copies of Notification Letters Sent to Local Political Subdivisions (with Receipts)

r. g. miller engineers

r.g. miller
engineers, inc.
Since 1966

January 11, 2011

CERTIFIED MAIL

Texas Department of Transportation
Mr. Jim Hunt, P.E.
Area Engineer
PO Box 1386
Houston, Texas 77251

RE: Notification that a Flood Protection Planning Grant Application is being Submitted to the Texas Water Development Board for the Rabbs Bayou and Gapps Bayou in Fort Bend County, Texas

Dear Mr. Hunt:

Fort Bend County is submitting a Flood Protection Planning Grand Application to the Texas Water Development Board (TWDB) to fund a Flood Protection Planning Study for the Rabbs Bayou and Gapps Bayou watersheds in Fort Bend County, Texas. The grant application is being prepared by R.G. Miller Engineers, Inc. on behalf of Fort Bend County.

The Fort Bend County Official Representative is:

Mark Vogler, P.E., CFM
Fort Bend County Drainage District
1004 Blume Road
Rosenberg, Texas 77471
voglermar@co.fort-bend.tx.us
Phone: (281) 342-2863
Fax: (281) 342-9130

The proposed planning area will include Rabbs Bayou from its confluence with the Brazos River upstream to Golfview Drive and Gapps Bayou from its confluence with the Brazos River upstream to Reading Road. The proposed Flood Protection Planning effort will be coordinated with FEMA Flood Insurance Studies that are ongoing or proposed for Fort Bend County projects.

The Texas Water Development Board Executive Administrator is:

J. Kevin Ward, Executive Administrator
Texas Water Development Board
1700 North Congress
PO Box 13231
Austin, Texas 78711-3231
Phone: (512) 463-7847
Fax: (512) 475-2053
Email: info@twdb.state.tx.us

Any comments on the proposed flood protection planning study must be filed with Fort Bend County and the Texas Water Development Board Executive Administrator within 30 days of the date on which this notice was mailed.

Fort Bend County invites your comments and participation in this important planning project.

Sincerely,

R. G. Miller Engineers, Inc.

Duane Barrett, P.E., CFM
Stormwater Management Department Manager

DB/hrs
J:\SOQ-LOI\Fort Bend County\Grant Application\Letter to City of Rosenberg.docx

r.g. miller
engineers, inc.
Since 1966

January 11, 2011

CERTIFIED MAIL

City of Richmond
Mayor Hilmar G. Moore
402 Morton
Richmond, Texas 77469

RE: Notification that a Flood Protection Planning Grant Application is being Submitted to the Texas Water Development Board for the Rabbs Bayou and Gapps Bayou in Fort Bend County, Texas

Dear Mayor Moore:

Fort Bend County is submitting a Flood Protection Planning Grand Application to the Texas Water Development Board (TWDB) to fund a Flood Protection Planning Study for the Rabbs Bayou and Gapps Bayou watersheds in Fort Bend County, Texas. The grant application is being prepared by R.G. Miller Engineers, Inc. on behalf of Fort Bend County.

The Fort Bend County Official Representative is:

Mark Vogler, P.E., CFM
Fort Bend County Drainage District
1004 Blume Road
Rosenberg, Texas 77471
voglermar@co.fort-bend.tx.us
Phone: (281) 342-2863
Fax: (281) 342-9130

The proposed planning area will include Rabbs Bayou from its confluence with the Brazos River upstream to Golfview Drive and Gapps Bayou from its confluence with the Brazos River upstream to Reading Road. The proposed Flood Protection Planning effort will be coordinated with FEMA Flood Insurance Studies that are ongoing or proposed for Fort Bend County projects.

The Texas Water Development Board Executive Administrator is:

J. Kevin Ward, Executive Administrator
Texas Water Development Board
1700 North Congress
PO Box 13231
Austin, Texas 78711-3231
Phone: (512) 463-7847
Fax: (512) 475-2053
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Duane Barrett, P.E., CFM
Stormwater Management Department Manager

DB/hrs
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r.g. miller
engineers, inc.
Since 1966

January 11, 2011

CERTIFIED MAIL

City of Rosenberg
Mayor Joe M. Gurecky
2110 Fourth Street
Rosenberg, Texas 77471

RE: Notification that a Flood Protection Planning Grant Application is being Submitted to the Texas Water Development Board for the Rabbs Bayou and Gapps Bayou in Fort Bend County, Texas

Dear Mayor Gurecky:

Fort Bend County is submitting a Flood Protection Planning Grand Application to the Texas Water Development Board (TWDB) to fund a Flood Protection Planning Study for the Rabbs Bayou and Gapps Bayou watersheds in Fort Bend County, Texas. The grant application is being prepared by R.G. Miller Engineers, Inc. on behalf of Fort Bend County.

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1004 Blume Road
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R. G. Miller Engineers, Inc.

Duane Barrett, P.E., CFM
Stormwater Management Department Manager

DB/hrs
J:\SOQ-LOI\Fort Bend County\Grant Application\Letter to City of Rosenberg.docx

r.g. miller
engineers, inc.
Since 1966

January 11, 2011

CERTIFIED MAIL

City of Sugar Land
Mayor James A. Thompson
PO Box 110
Sugar Land, Texas 77487-0110

RE: Notification that a Flood Protection Planning Grant Application is being Submitted to the Texas Water Development Board for the Rabbs Bayou and Gapps Bayou in Fort Bend County, Texas

Dear Mayor Thompson:

Fort Bend County is submitting a Flood Protection Planning Grand Application to the Texas Water Development Board (TWDB) to fund a Flood Protection Planning Study for the Rabbs Bayou and Gapps Bayou watersheds in Fort Bend County, Texas. The grant application is being prepared by R.G. Miller Engineers, Inc. on behalf of Fort Bend County.

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Mark Vogler, P.E., CFM
Fort Bend County Drainage District
1004 Blume Road
Rosenberg, Texas 77471
voglermar@co.fort-bend.tx.us
Phone: (281) 342-2863
Fax: (281) 342-9130

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PO Box 13231
Austin, Texas 78711-3231
Phone: (512) 463-7847
Fax: (512) 475-2053
Email: info@twdb.state.tx.us

Any comments on the proposed flood protection planning study must be filed with Fort Bend County and the Texas Water Development Board Executive Administrator within 30 days of the date on which this notice was mailed.

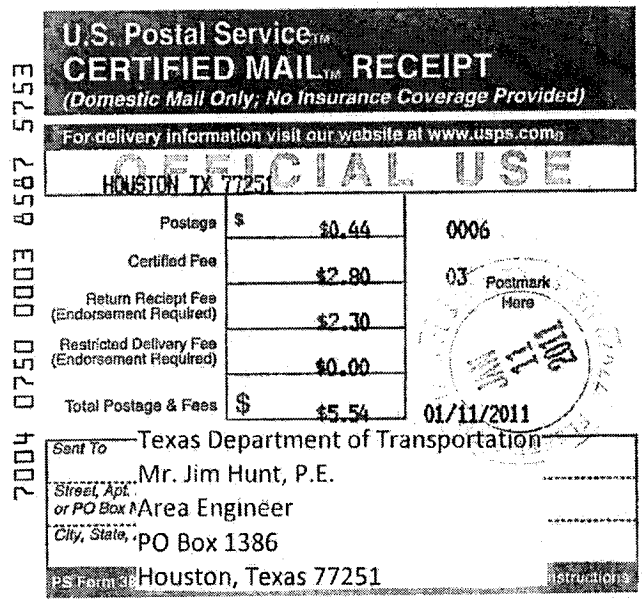
Fort Bend County invites your comments and participation in this important planning project.

Sincerely,

R. G. Miller Engineers, Inc.

Duane Barrett, P.E., CFM
Stormwater Management Department Manager

DB/hrs
J:\SOQ-LOI\Fort Bend County\Grant Application\Letter to City of Sugar Land.docx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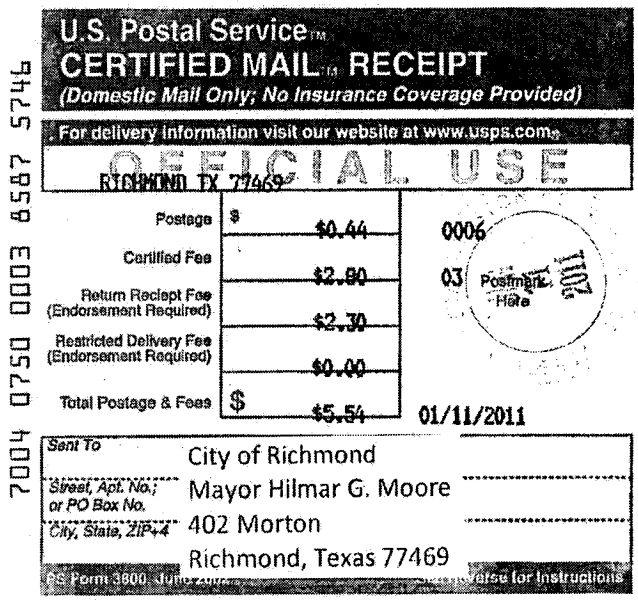
HOUSTON TX 77251
Postage $0.44
Certified Fee $2.80
Return Receipt Fee (Endorsement Required) $2.30
Restricted Delivery Fee (Endorsement Required) $0.00
Total Postage & Fees $5.54
0006
03
Postmark Here
01/11/2011
Sent To Texas Department of Transportation
Street, Apt. or PO Box No. Mr. Jim Hunt, P.E.
City, State, Area Engineer
PO Box 1386
Houston, Texas 77251
PS Form 3800
Instructions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U.S. Postal Service™
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For delivery information visit our website at www.usps.com®
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RICHMOND TX 77469
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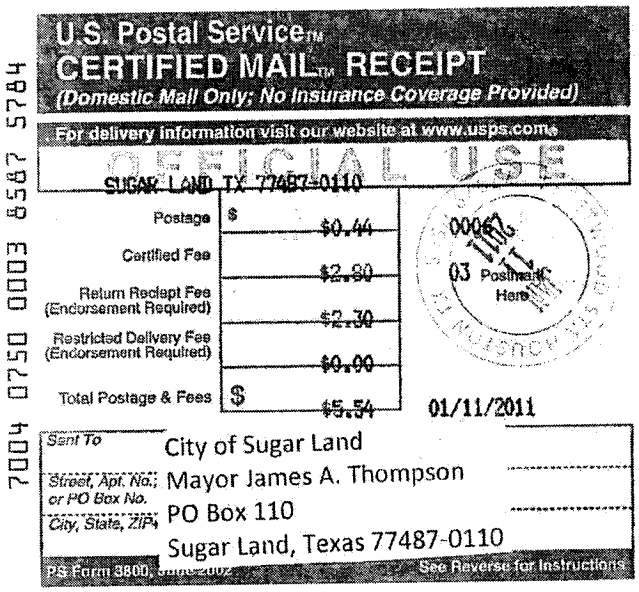
Return Receipt Fee (Endorsement Required) $2.30
Restricted Delivery Fee (Endorsement Required) $0.00
Total Postage & Fees $5.54
0006
03
Postmark Here
01/11/2011
Sent To City of Richmond
Street, Apt. No.; or PO Box No. Mayor Hilmar G. Moore
City, State, ZIP+4 402 Morton
Richmond, Texas 77469
PS Form 3800, June 2006
See Reverse for Instructions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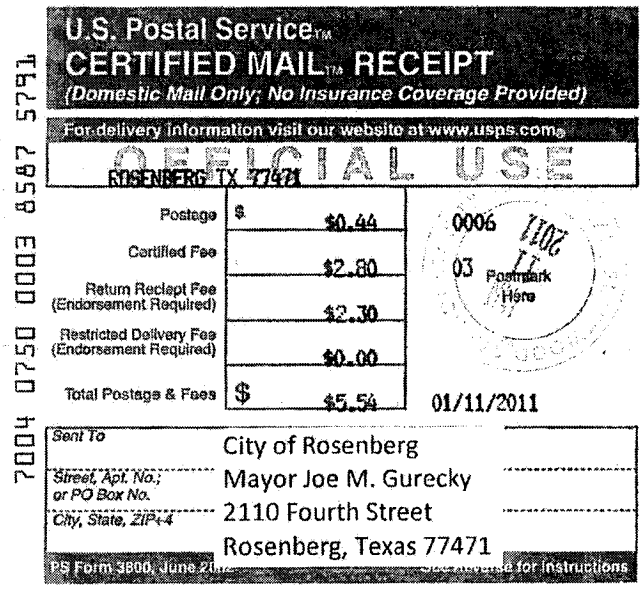
SUGAR LAND TX 77487-0110
Postage $0.44
Certified Fee $2.80
Return Receipt Fee (Endorsement Required) $2.30
Restricted Delivery Fee (Endorsement Required) $0.00
Total Postage & Fees $5.54
0006
03
Postmark Here
01/11/2011
Sent To City of Sugar Land
Street, Apt. No.; or PO Box No. Mayor James A. Thompson
City, State, ZIP+4 PO Box 110
Sugar Land, Texas 77487-0110
PS Form 3800, June 2006
See Reverse for Instructions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U.S. Postal Service™
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ROSENBERG TX 77471
Postage $0.44
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Return Receipt Fee (Endorsement Required) $2.30
Restricted Delivery Fee (Endorsement Required) $0.00
Total Postage & Fees $5.54
0006
03
Postmark Here
01/11/2011
Sent To City of Rosenberg
Street, Apt. No.; or PO Box No. Mayor Joe M. Gurecky
City, State, ZIP+4 2110 Fourth Street
Rosenberg, Texas 77471
PS Form 3800, June 2006
See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

City of Richmond
Mayor Hilmar G. Moore
402 Morton
Richmond, Texas 77469

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) TA Miller C. Date of Delivery 1-12-11

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service lab) 7004 0750 0003 8587 5746

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Texas Department of Transportation
Mr. Jim Hunt, P.E.
Area Engineer
PO Box 1386
Houston, Texas 77251

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery JAN 12 2011

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 0750 0003 8587 5753

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

City of Rosenberg
Mayor Joe M. Gurecky
2110 Fourth Street
Rosenberg, Texas 77471

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) Al Gardner C. Date of Delivery 1-13-11

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

JAN 13 2011

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service l 7004 0750 0003 8587 5791

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

City of Sugar Land
Mayor James A. Thompson
PO Box 110
Sugar Land, Texas 77487-0110

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery 1/12/11

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 0750 0003 8587 5784

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

Exhibit 44

ATTACHMENT 4

POWERPOINT® PRESENTATION

Slides from PowerPoint® Presentation on
Fort Bend County

r. g. miller
engineers

Fort Bend County, Texas

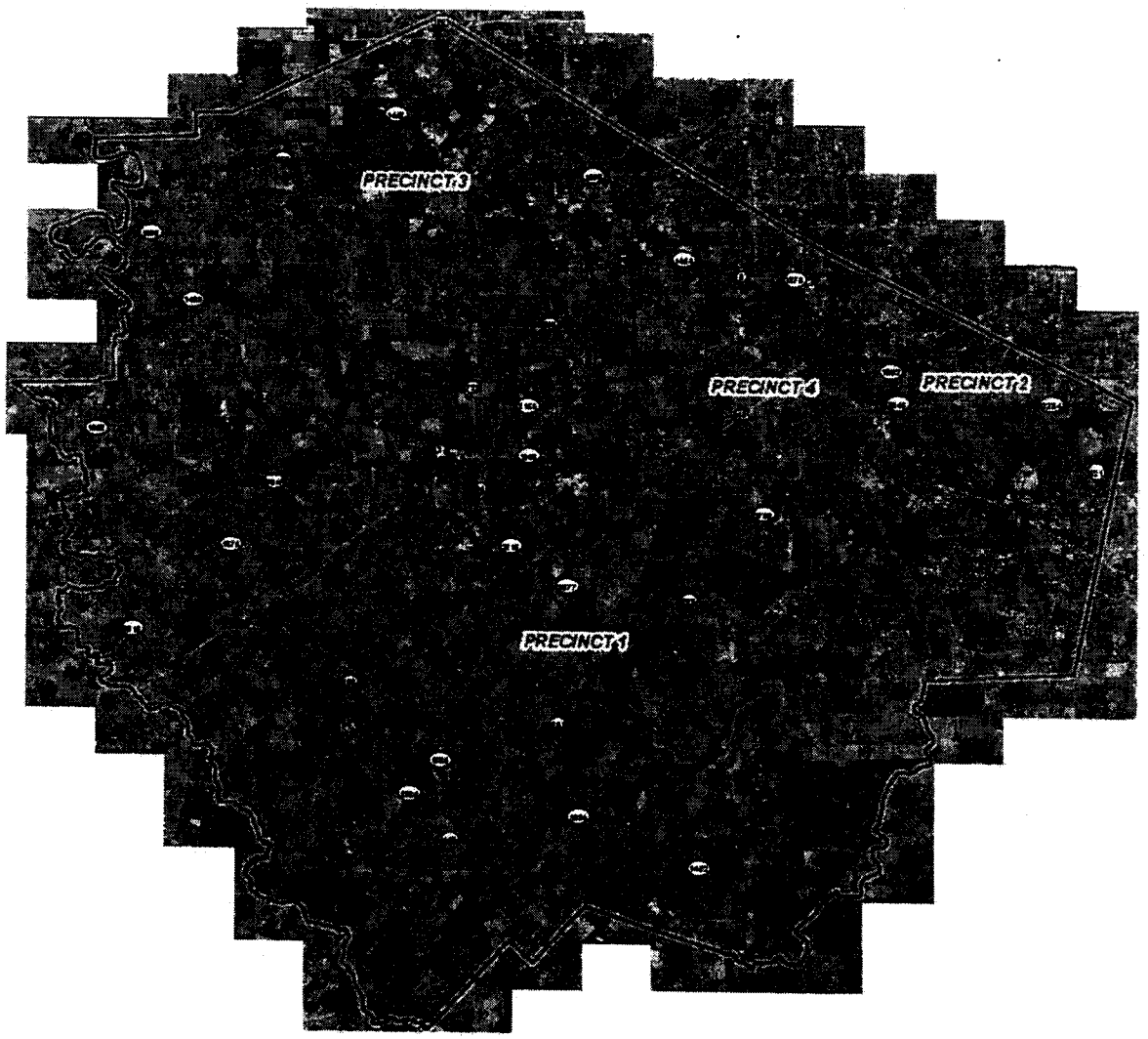
County Judge
Robert Hebert

Precinct 1
Commissioner
Richard Morrison

Precinct 2
Commissioner
Grady Prestage

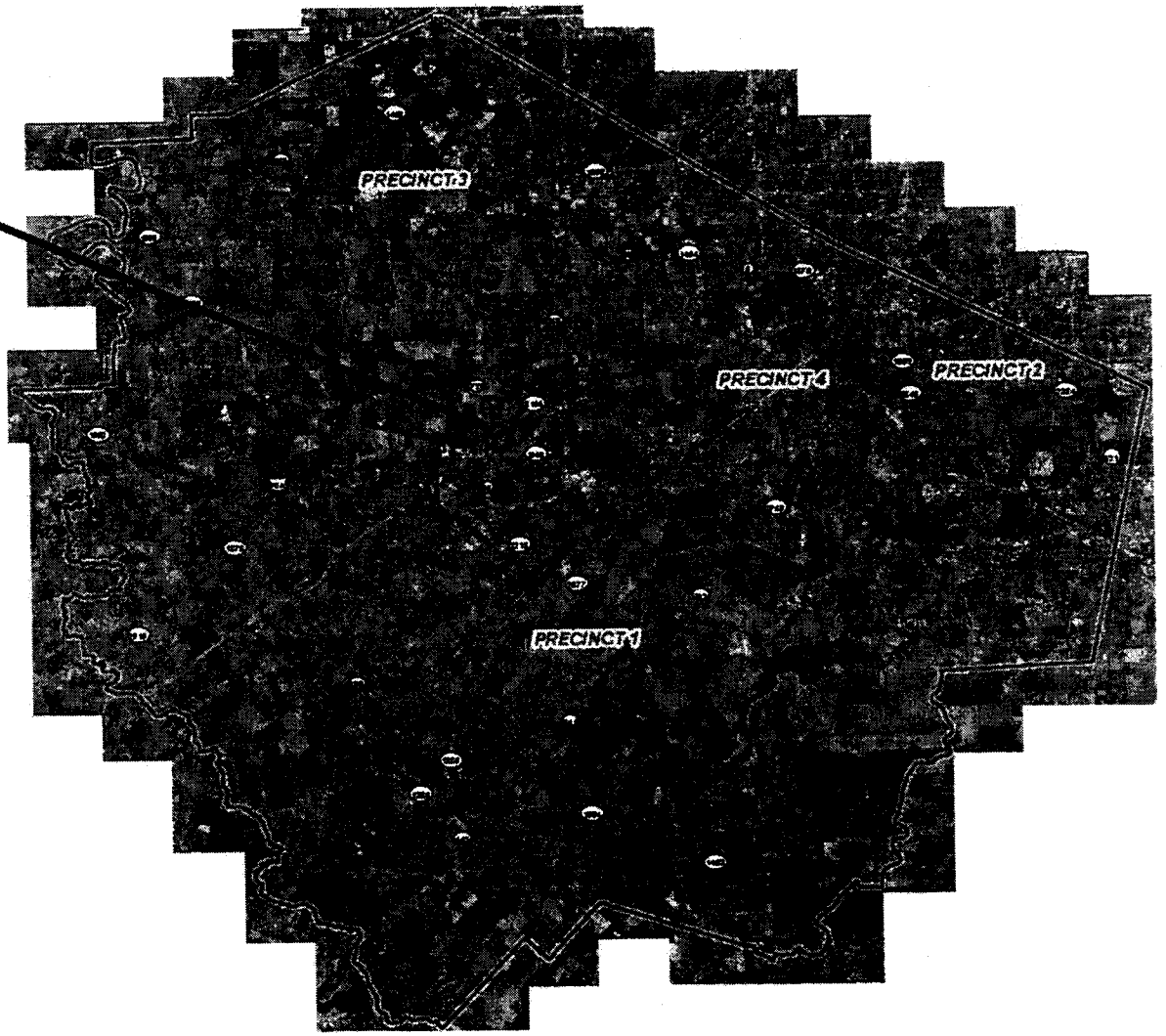
Precinct 3
Commissioner
Andy Meyers

Precinct 4
Commissioner
James Patterson



Fort Bend County, Texas

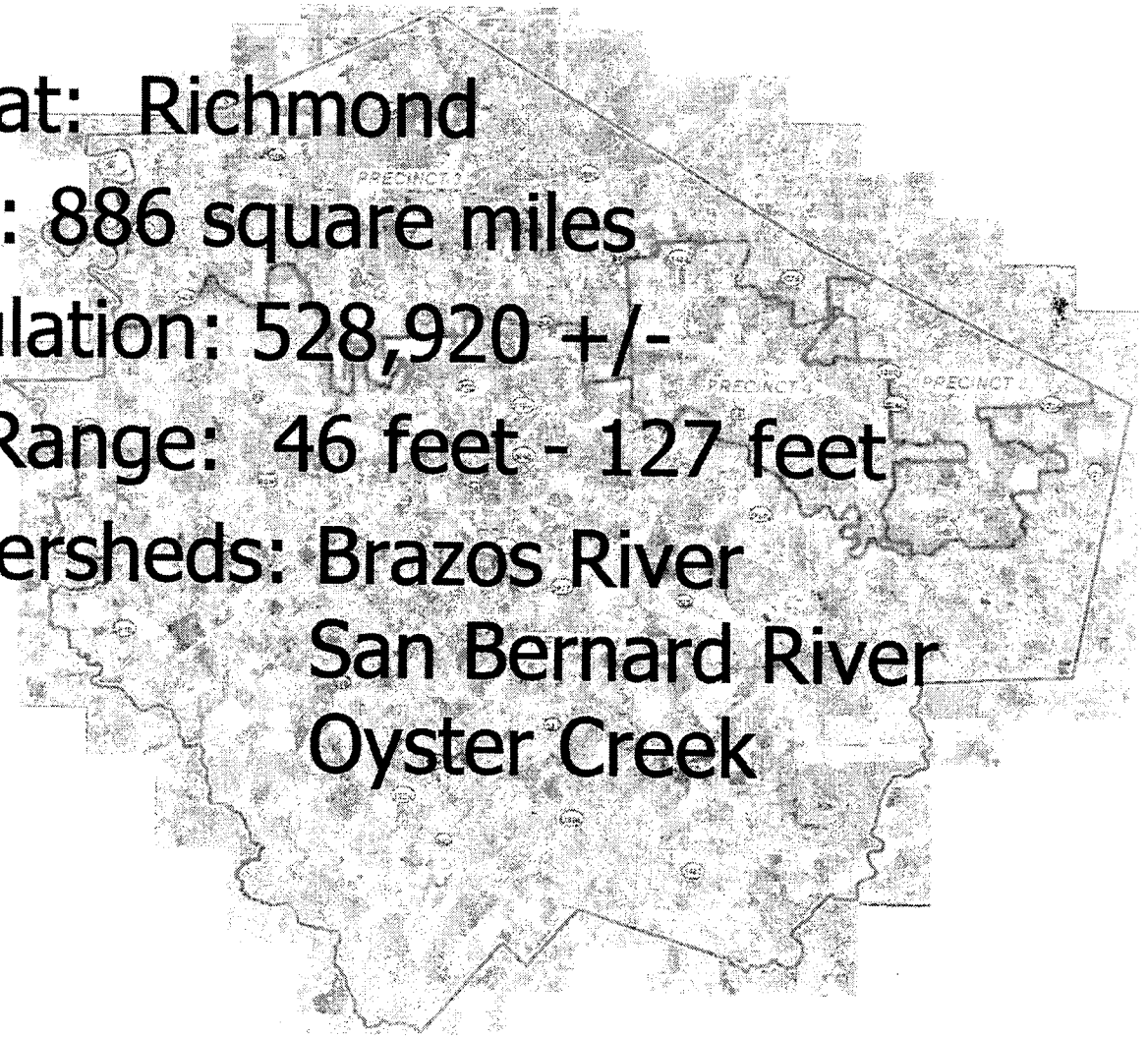
County Seat:
Richmond



Urbanization has historically been concentrated in the northeastern portion of the county, but is spreading across the rest of the county at a rapid pace.

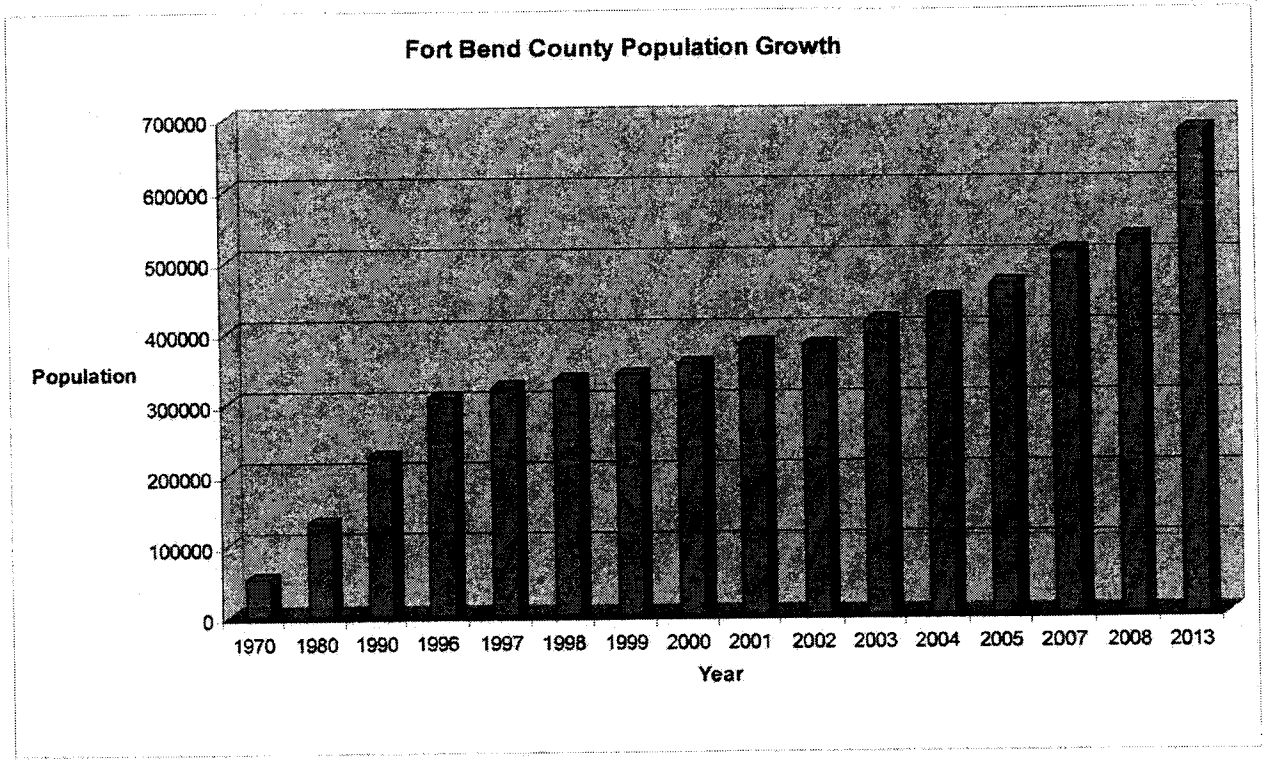
Fort Bend Facts & Figures

- County Seat: Richmond
- Total Area: 886 square miles
- 2008 Population: 528,920 +/-
- Elevation Range: 46 feet - 127 feet
- Major Watersheds: Brazos River
  San Bernard River
  Oyster Creek



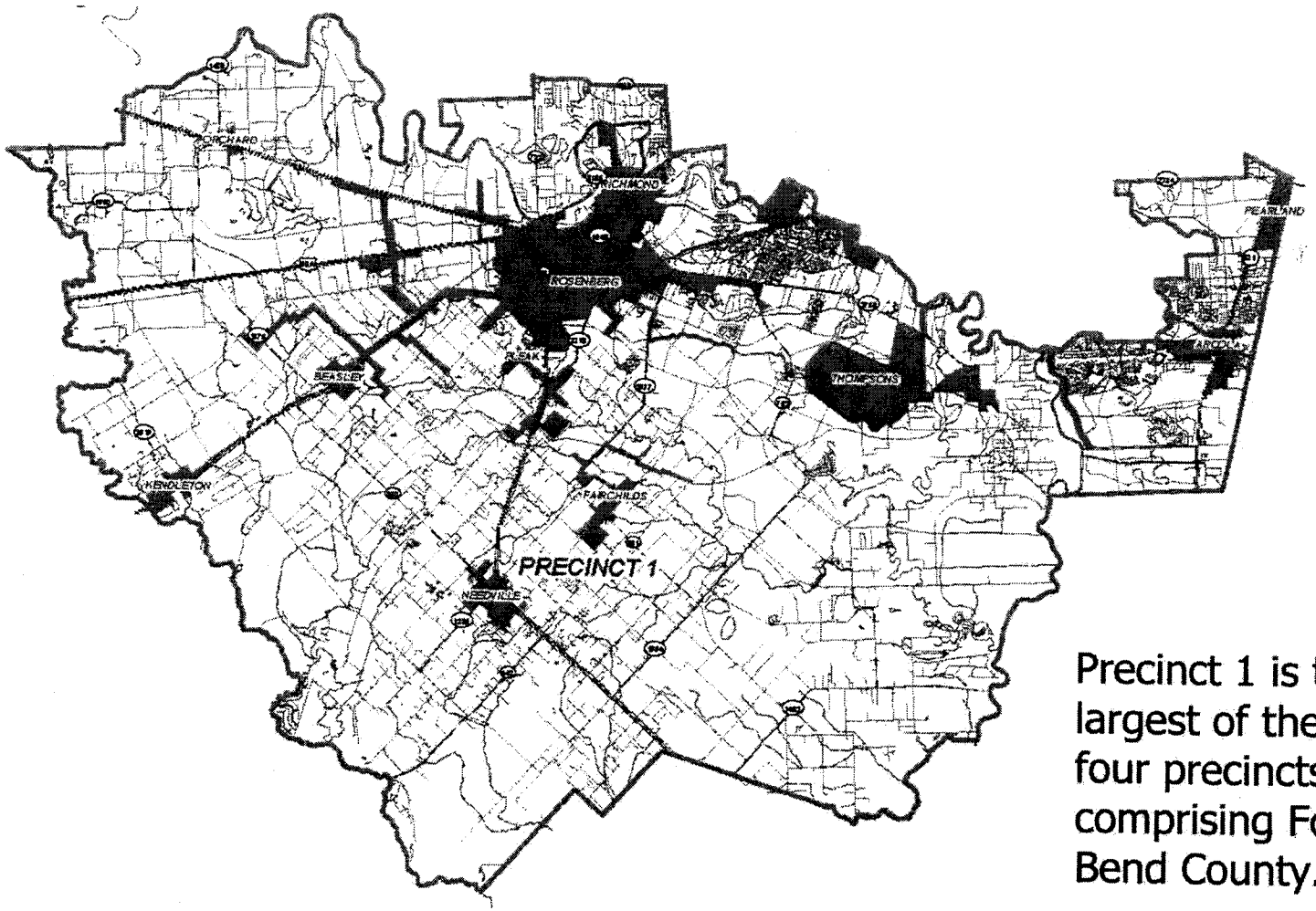
Fort Bend Facts & Figures

Year	Population
1970	52,314
1980	130,846
1990	225,421
1996	307,403
1997	321,149
1998	331,792
1999	339,585
2000	354,452
2001	381,200
2002	380,220
2003	412,570
2004	442,620
2005	463,650
2007	509,822
2008	528,392
2013*	678,353



*Fort Bend County's population is among the fastest growing in the United States. The 2013 population estimate above was developed by the Fort Bend Economic Development Council.

Fort Bend County Precinct 1



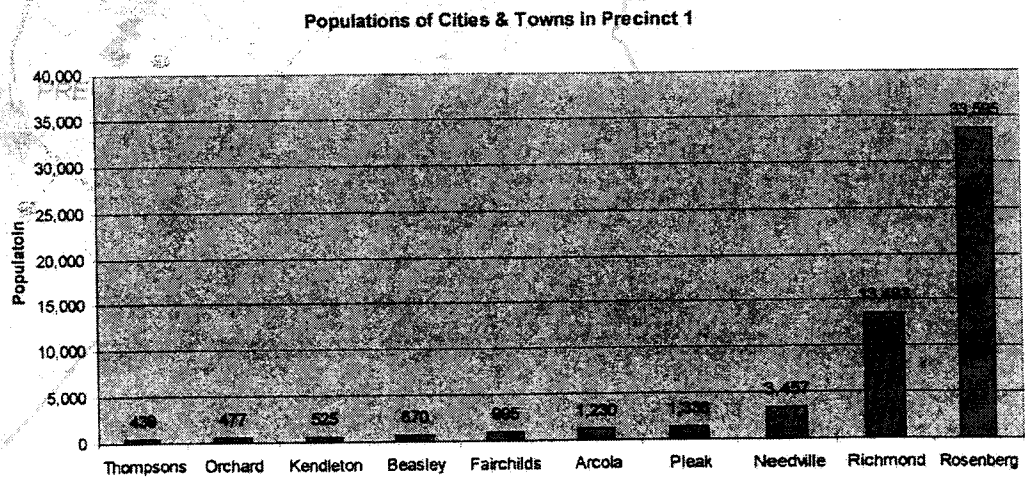
Precinct 1 is the largest of the four precincts comprising Fort Bend County.

Fort Bend County Precinct 1

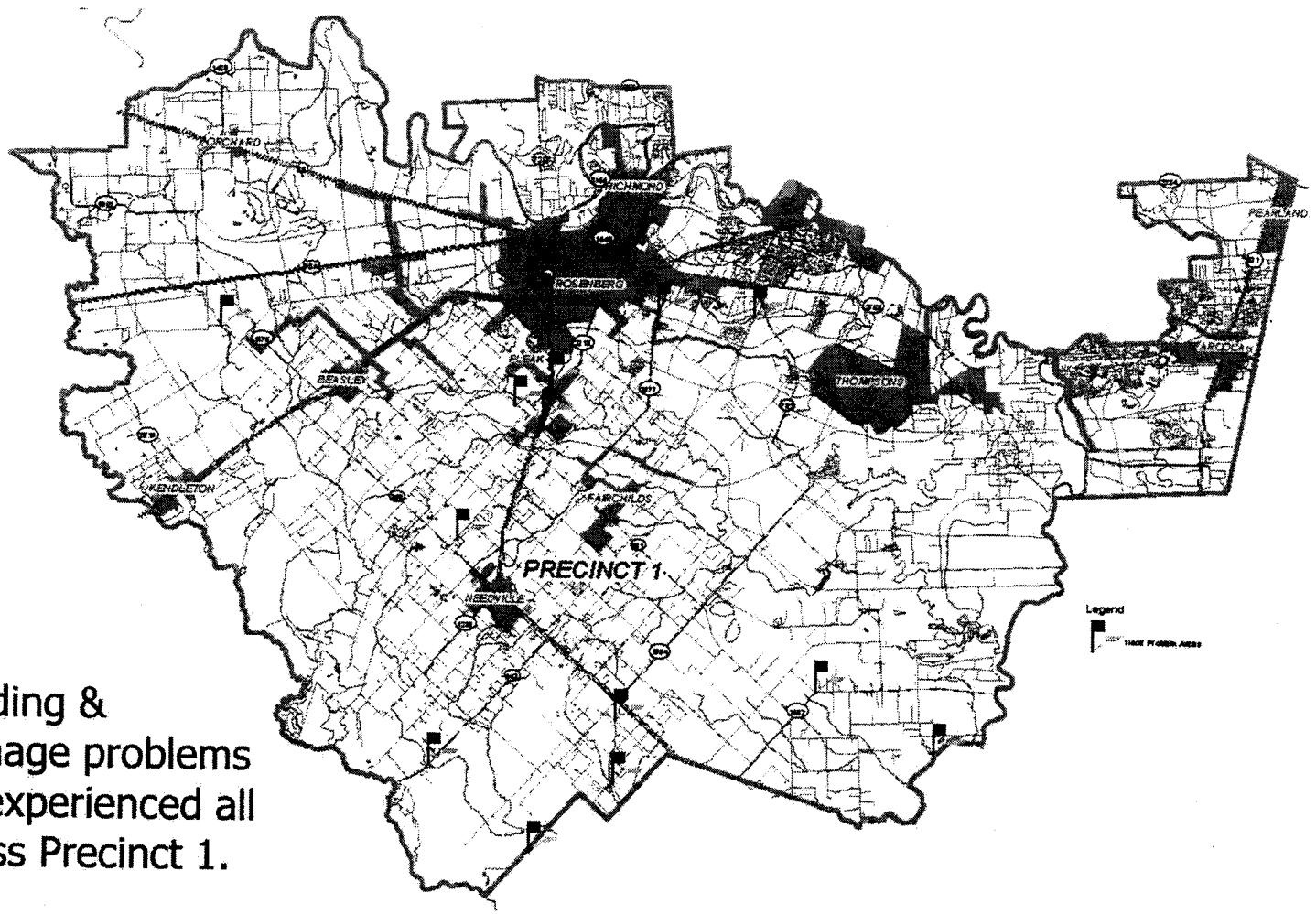
Cities & Towns in Precinct 1:

- **Richmond**
- **Rosenberg**
- **Thompsons**
- **Arcola**
- **Fairchilds**
- **Pleak**
- **Needville**
- **Beasley**
- **Kendleton**
- **Orchard**





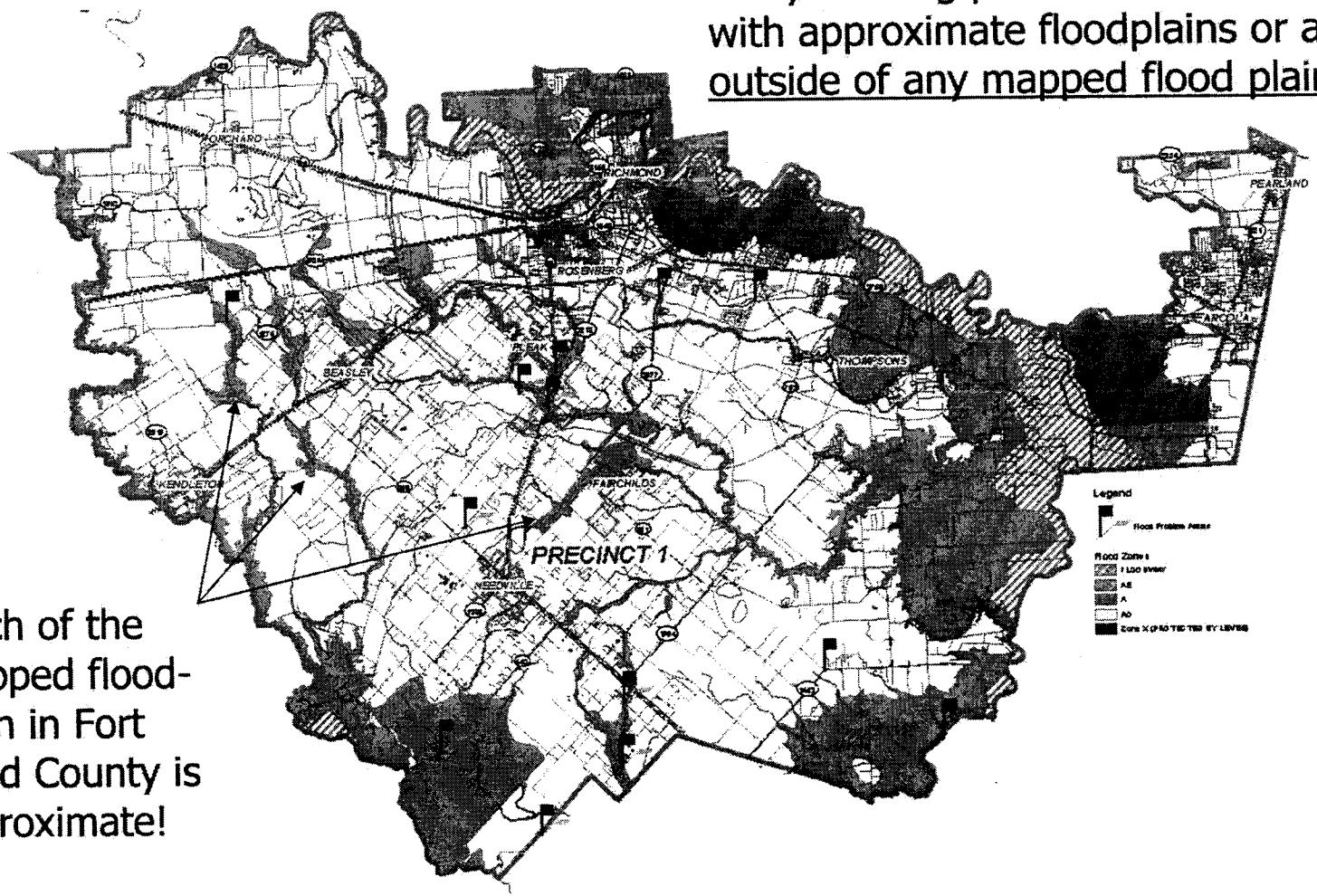
Drainage Problem Areas



Flooding & drainage problems are experienced all across Precinct 1.

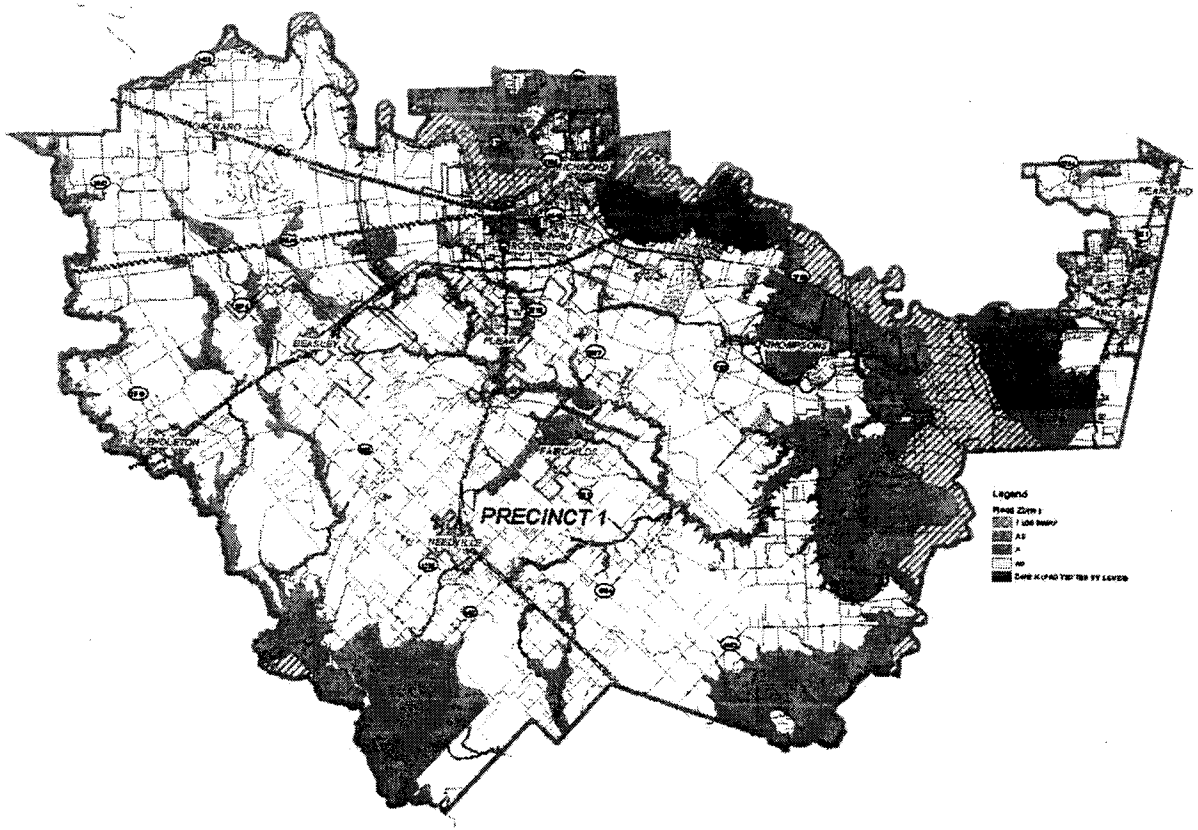
Drainage Problems & Flood Plains

Many existing problem areas coincide with approximate floodplains or are <u>outside of any mapped flood plain</u>!



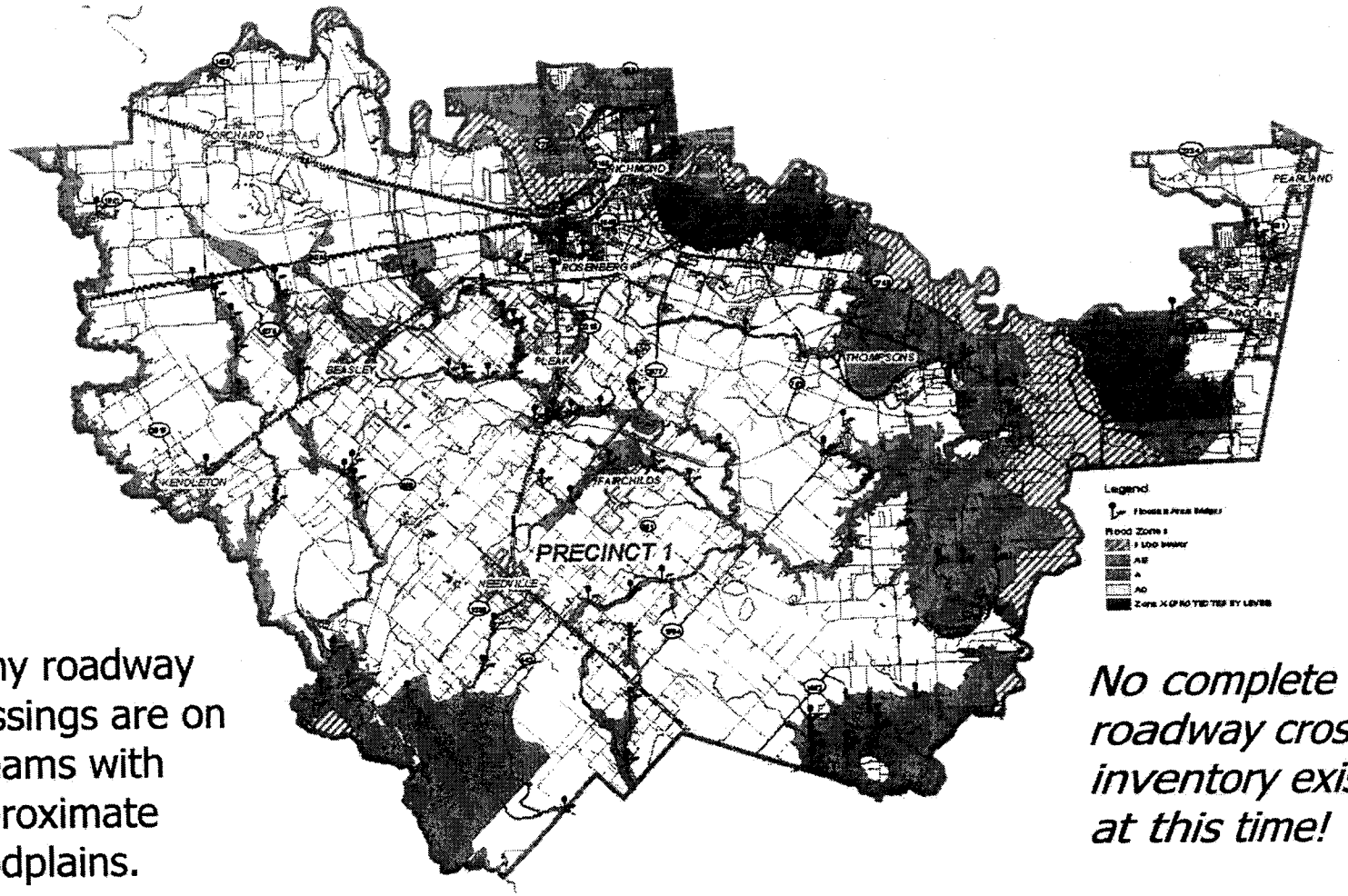
Much of the mapped flood-plain in Fort Bend County is approximate!

Precinct 1 Flood Plains



Streams in Precinct 1	FEMA Study Status
Big Creek	Approximate
Fairchilds Creek	Approximate
Snake Creek	Approximate
Cedar Creek	Approximate
Turkey Creek (San Bernard)	Approximate
Mound Creek	Approximate
Deer Creek	Approximate
Seabourne Creek	Partially Studied
Dry Creek	Partially Studied
Coon Creek	Partially Studied
San Bernard River	Partially Studied
Rabbs Bayou	Partially Studied
Brazos River	Studied
Mustang Creek	Studied
Cow Creek	Unstudied
Gapps Slough	Unstudied
Cottonwood Creek	Unstudied
Turkey Creek (Brazos)	Unstudied
House Bayou	Unstudied
Dutch John Creek	Unstudied
Robinowitz Ditch	Unstudied
Sandy Branch	Unstudied
Duvall Ditch	Unstudied

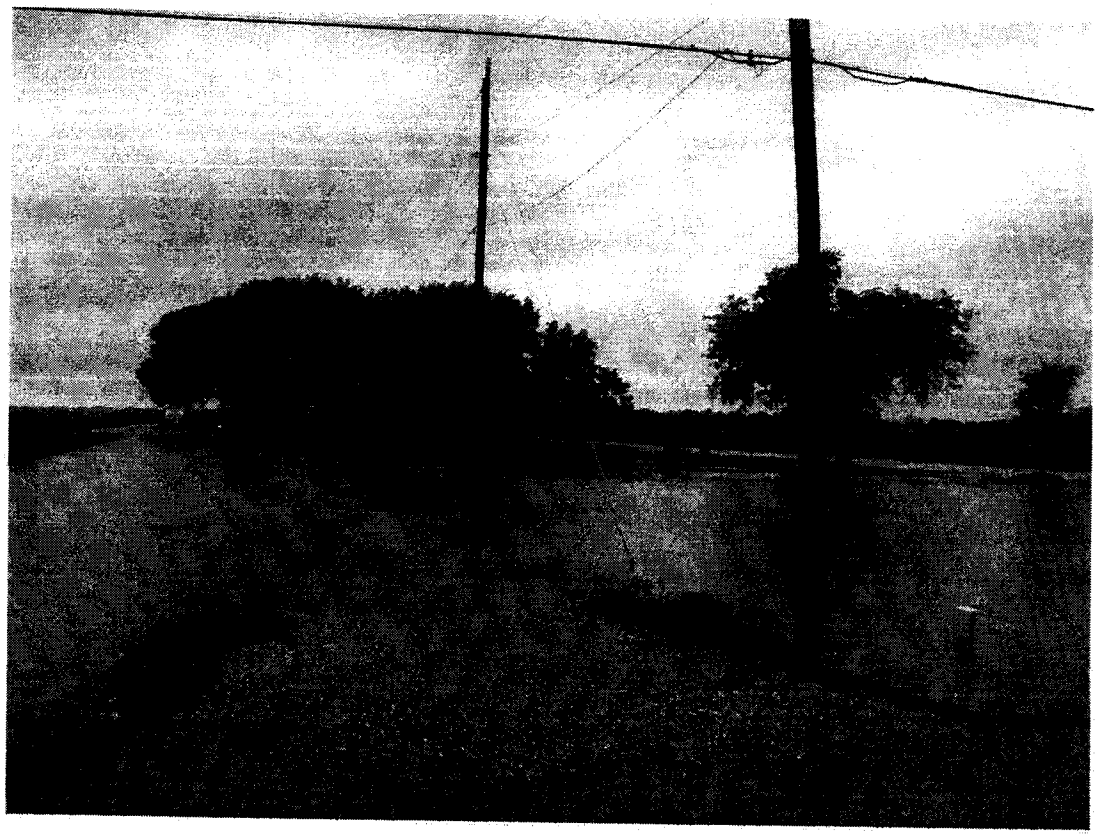
Precinct 1 Roadway Crossings



Many roadway crossings are on streams with approximate floodplains.

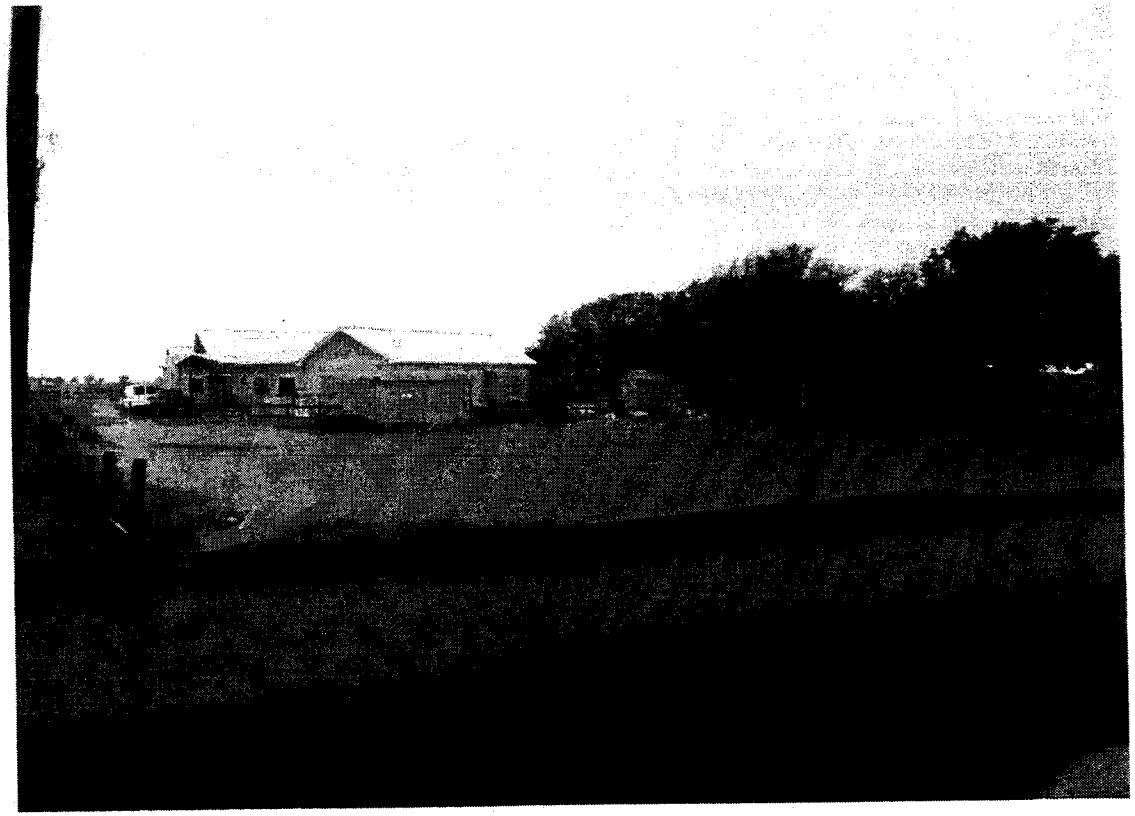
No complete roadway crossing inventory exists at this time!

Precinct 1 Flooding



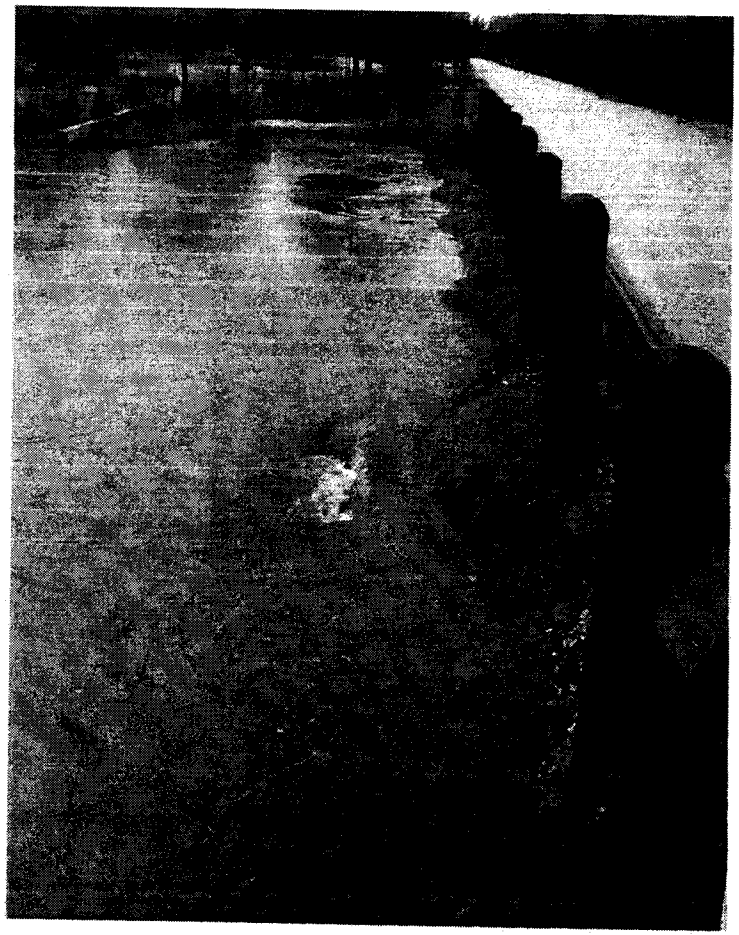
Oberhoff Home on Gerken Road - July 2, 2010
Max. Rainfall 7.4" @ Fairchilds

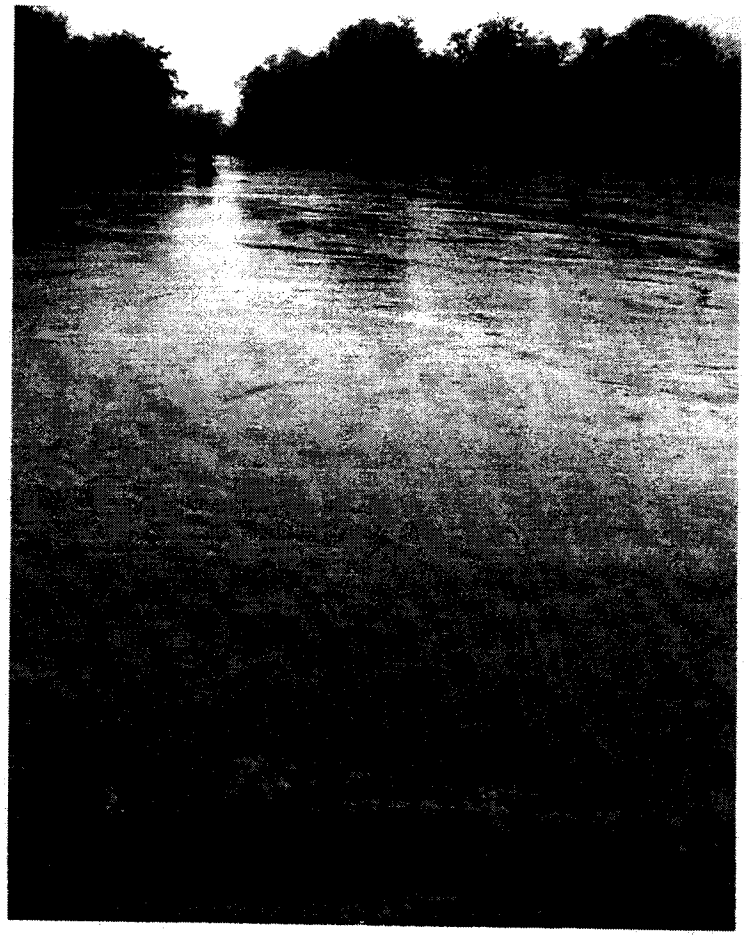
Precinct 1 Flooding



Parks Youth Ranch - July 2, 2010
Max. Rainfall 7.4" @ Fairchilds

Precinct 1 Flooding





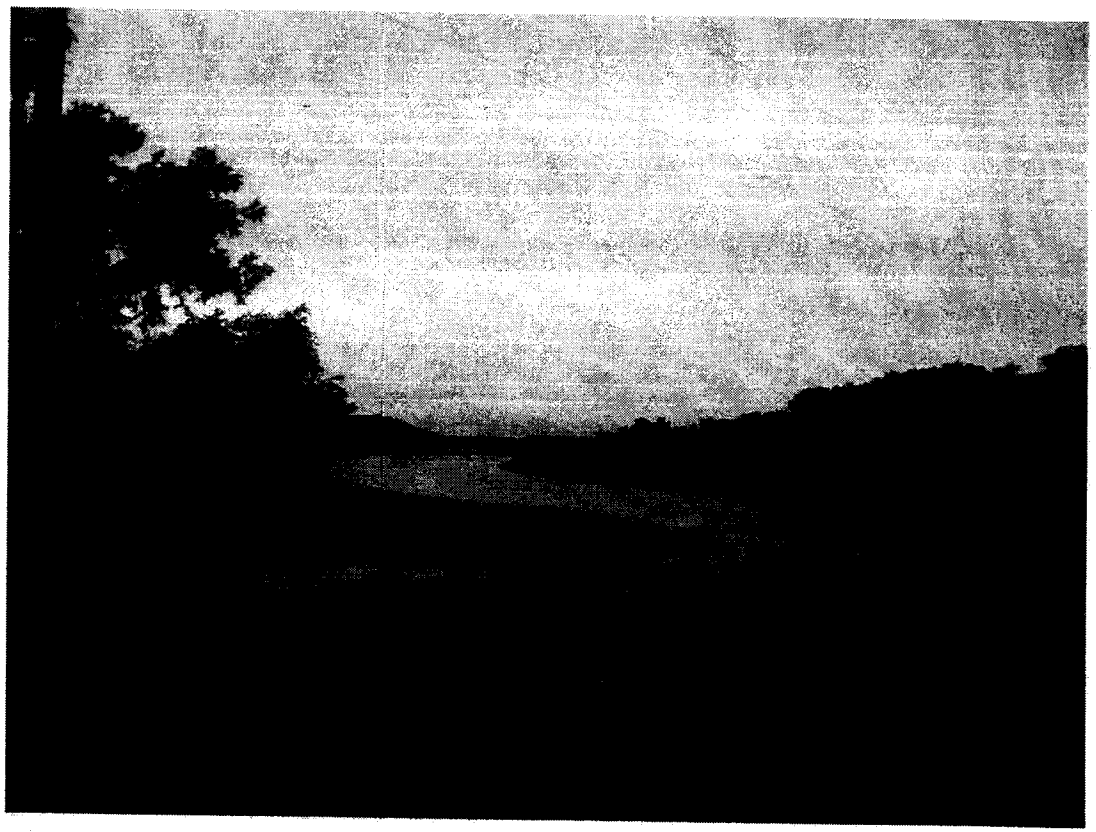
Fairchilds Creek Lateral II-B-10-b - July 2, 2010
Max. Rainfall 7.4" @ Fairchilds

Precinct 1 Flooding



Big Creek Lateral II-B-6 - May 14, 2010
Max. Rainfall 7.4" @ Pleak

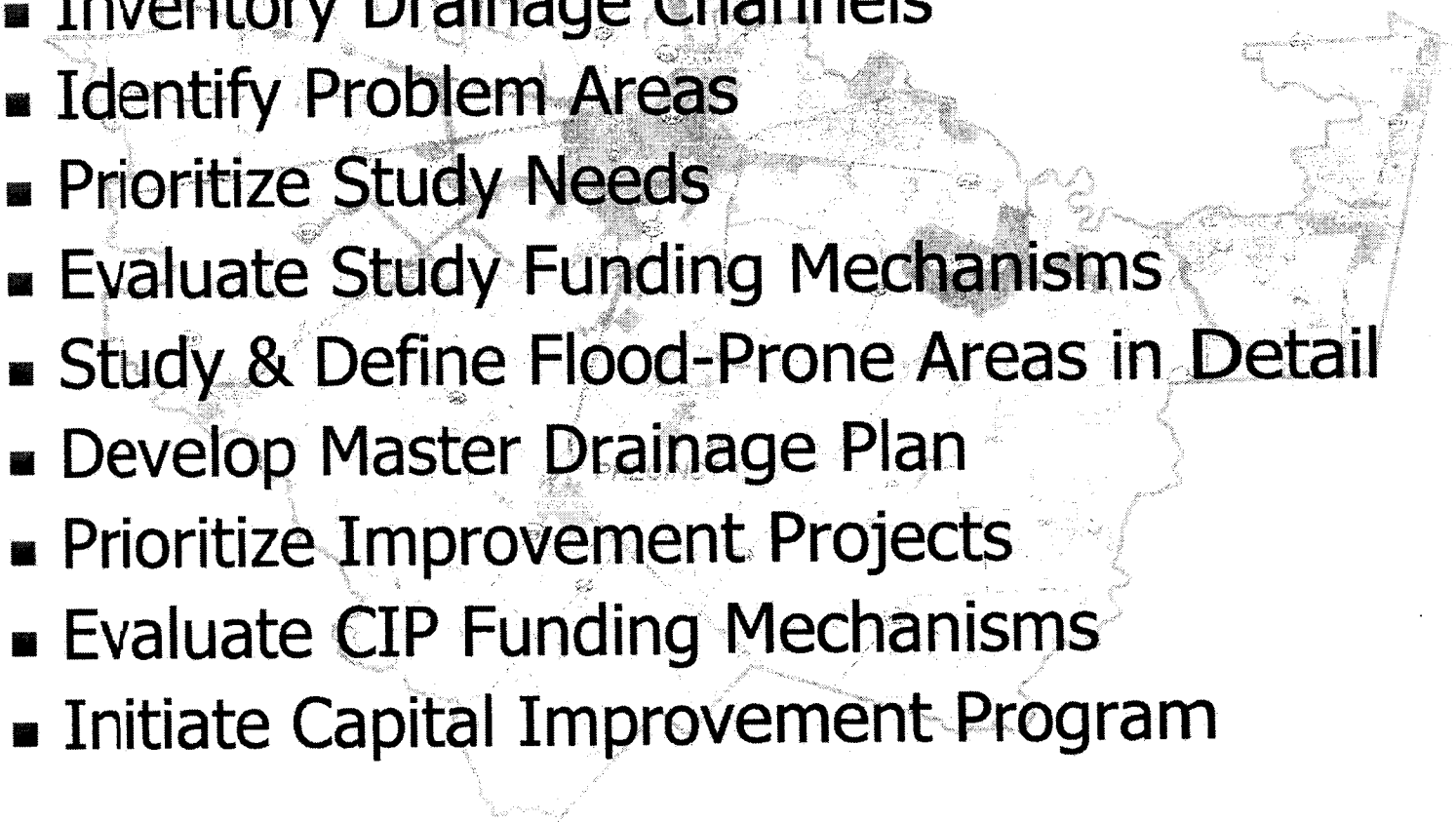
Precinct 1 Flooding



Big Creek at Pleak Road - May 14, 2010
Max. Rainfall 7.4" @ Pleak

Recommended Action Plan

- Inventory Roadway Crossings
- Inventory Drainage Channels
- Identify Problem Areas
- Prioritize Study Needs
- Evaluate Study Funding Mechanisms
- Study & Define Flood-Prone Areas in Detail
- Develop Master Drainage Plan
- Prioritize Improvement Projects
- Evaluate CIP Funding Mechanisms
- Initiate Capital Improvement Program

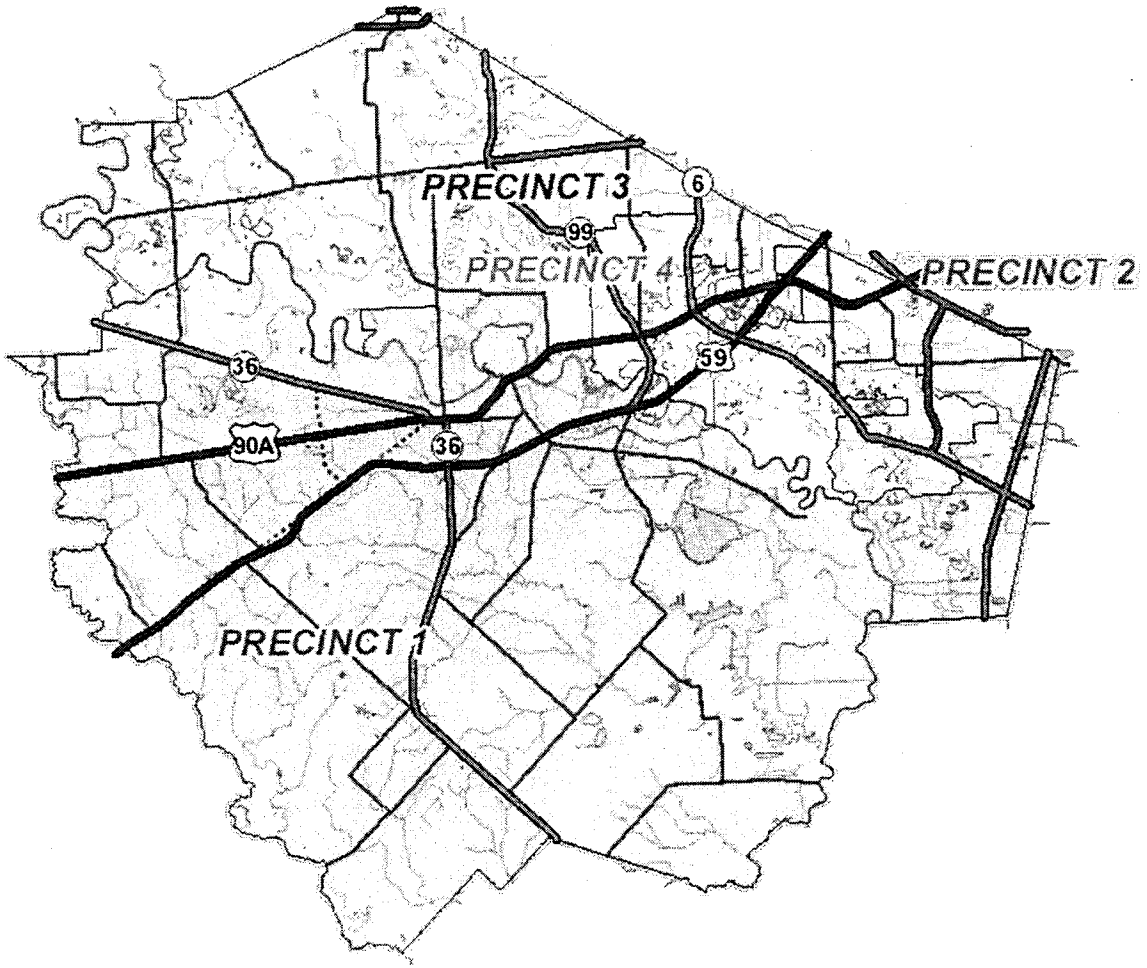


ATTACHMENT 5

FORT BEND COUNTY INFORMATION

Information from County Web Site & Other Sources

r. g. miller engineers



THE STATE OF TEXAS
FORT BEND COUNTY

6.581 miles

Geographic Technologies Group

N
W
E
S

Fort Bend County Profile

Compiled by
The County Information Project, Texas Association of Counties

The information contained in this report was obtained from The County Information Project's on-line database. The data contained in the database are obtained from official sources and are not the product of the CIP. The CIP, therefore, does not expressly or impliedly warrant the accuracy of the data. Questions regarding the accuracy, methodology, etc. should be directed to the original source of the information. The sources may be obtained from the CIP by contacting the County Information Project, Texas Association of Counties at (512) 478-8753.

POPULATION (Census Bureau)	
County Population «History» «Group Quarters»	
Estimate 2009:	556,870
Estimate 2008:	532,609
Estimate 2007:	508,260
Estimate 2006:	484,522
Estimate 2005:	458,234
Estimate 2004:	437,642
Estimate 2003:	416,208
Estimate 2002:	396,554
Estimate 2001:	375,122
Census 2000:	354,452
Census 1990:	225,421
Census 1950:	31,056
Population of the County Seat (Richmond)	
Census 2000:	11,081
Census 1990:	10,042
POPULATION ESTIMATES - 2009 (Census Bureau)	
Note: City and town populations include only those parts of each place found within this county. Use our «Town & City Search» to find the total population of each place.	
Fort Bend County:	556,870
Arcola city:	1,236
Beasley city:	676
Fairchilds village:	1,057
Fulshear city:	955
Houston city (pt.):	39,050
Katy city (pt.):	1,420
Kendleton city:	526
Meadows Place city:	6,377
Missouri City city (pt.):	68,524
Needville city:	3,467
Orchard city:	479
Pearland city (pt.):	259
Pleak village:	1,408
Richmond city:	13,532
Rosenberg city:	33,962
Simonton city:	872
Stafford city (pt.):	19,165
Sugar Land city:	81,725
Thompsons town:	485
Weston Lakes city:	1,297
Balance of Fort Bend County:	280,398
GENERAL INFORMATION	
County Size in Square Miles (Census Bureau and EPA)	
Land Area:	875
Water Area:	11
Total Area:	886

Population Density Per Square Mile	
2000:	405.1
DEMOGRAPHICS	
Ethnicity - 2008 (Census Bureau)	
Percent Hispanic:	23.9%
Race - 2008 (Census Bureau)	
Percent White Alone:	62.4%
Percent African American Alone:	20.9%
Percent American Indian and Alaska Native Alone:	0.4%
Percent Asian Alone:	14.7%
Percent Native Hawaiian and Other Pacific Islander Alone:	0.1%
Percent Multi-Racial:	1.5%
Age - 2009 (Census Bureau)	
17 and Under:	0.3%
65 and Older:	0.1%
85 and Older:	0.0%
Median Age:	34.9
Income	
Per Capita Income - 2008 (BEA):	$44,265
Total Personal Income - 2008 (BEA):	$23,575,848,000
Median Household Income - 2008 (Census Bureau):	$83,968
Poverty - 2008 (Census Bureau)	
Percent of Population in Poverty:	8.0%
Percent of Population under 18 in Poverty:	10.2%
Wages (BEA)	
Average Wage Per Job - 2008:	$47,422
Average Wage Per Job - 2007:	$46,450
Average Wage Per Job - 2006:	$43,980
Average Wage Per Job - 2005:	$42,245
Average Wage Per Job - 2004:	$38,495
Average Wage Per Job - 2003:	$37,209
Average Wage Per Job - 2002:	$36,689
Average Wage Per Job - 2001:	$36,338
Average Wage Per Job - 2000:	$35,005
Average Wage Per Job - 1990:	$23,313
Annual Unemployment Rate, Not Adjusted (Texas Workforce Commission)	
Unemployment Rate - 2009:	7.2
Unemployment Rate - 2008:	4.5
Unemployment Rate - 2007:	4.0
Unemployment Rate - 2006:	4.6
Unemployment Rate - 2005:	5.1
Unemployment Rate - 2004:	5.5
Unemployment Rate - 2003:	6.1
Unemployment Rate - 2002:	5.2
Unemployment Rate - 2001:	3.9
Unemployment Rate - 2000:	3.6
County Business Patterns (Census Bureau): «CBP 2008»	
COUNTY FINANCES (Texas Comptroller of Public Accounts)	
Property Taxes - 2008	
Total County Tax Rate: «Historic Tax Rate» «Detailed Tax Rates»	$0.499750
Total Market Value: «Values and Levies»	$47,727,143,111
Total Appraised Value Available for County Taxation:	$38,147,525,694
Total Actual Levy:	$190,736,711
Sales Tax Allocation History	
CY 2009:	$N/A
CY 2008:	$N/A
CY 2007:	$N/A

CY 2006:	$N/A
CY 2005:	$N/A
CY 2004:	$N/A
CY 2003:	$N/A
CY 2002:	$N/A
CY 2001:	$N/A
INFRASTRUCTURE EXPENDITURES (Texas Comptroller of Public Accounts)	
Road and Bridge - 2008	
County Roads, Construction:	$6,074,628
County Roads, Maintenance:	$6,074,096
County Roads, Rehabilitation:	$0
County Bridges, Construction:	$380,931
County Bridges, Maintenance:	$1,335,330
County Bridges, Rehabilitation:	$0
Right of Way Acquisition:	$82,742
Utility Construction:	$0
Other Road Expenditures:	$4,856,816
Total Road and Bridge Expenditures:	**$18,804,543**
COUNTY ROAD MILES (TXDOT)	
Centerline Miles - 2004	
Unpaved (Earth and All-weather):	180
Paved (bituminous surface, treated, less than 1):	579
Paved (mixed bituminous surface, base and surface depth 7):	0
Paved (mixed bituminous surface, base and surface depth 7 or more):	0
Asphalt:	0
Concrete:	451
Total Centerline Miles:	**1,210**
Lane Miles - 2004	
Unpaved (Earth and All-weather):	360
Paved (bituminous surface, treated, less than 1):	1,159
Paved (mixed bituminous surface, base and surface depth 7):	0
Paved (mixed bituminous surface, base and surface depth 7 or more):	0
Asphalt:	0
Concrete:	964
Total Lane Miles:	**2,483**

Special Districts in Fort Bend County.
School Districts in Fort Bend County.
History of City Tax Rates in Fort Bend County.

Airports in Fort Bend County.
Hospitals in Fort Bend County.
Prisons in Fort Bend County.

The County Information Project | County Profiles | Advanced Search | County Locator Map | Town & City Search

State & County QuickFacts

Fort Bend County, Texas

People QuickFacts	Fort Bend County	Texas
Population, 2009 estimate	556,870	24,782,302
Population, percent change, April 1, 2000 to July 1, 2009	57.1%	18.8%
Population estimates base (April 1) 2000	354,452	20,851,818
Persons under 5 years old, percent, 2009	7.4%	8.4%
Persons under 18 years old, percent, 2009	29.2%	27.8%
Persons 65 years old and over, percent, 2009	7.0%	10.2%
Female persons, percent, 2009	50.0%	50.1%
White persons, percent, 2009 (a)	61.7%	82.1%
Black persons, percent, 2009 (a)	21.1%	12.0%
American Indian and Alaska Native persons, percent, 2009 (a)	0.5%	0.8%
Asian persons, percent, 2009 (a)	15.2%	3.6%
Native Hawaiian and Other Pacific Islander, percent, 2009 (a)	0.1%	0.1%
Persons reporting two or more races, percent, 2009	1.6%	1.4%
Persons of Hispanic or Latino origin, percent, 2009 (b)	23.8%	36.9%
White persons not Hispanic, percent, 2009	39.1%	46.7%
Living in same house in 1995 and 2000, pct 5 yrs old & over	52.0%	49.6%
Foreign born persons, percent, 2000	18.3%	13.9%
Language other than English spoken at home, pct age 5+, 2000	30.7%	31.2%
High school graduates, percent of persons age 25+, 2000	84.3%	75.7%
Bachelor's degree or higher, pct of persons age 25+, 2000	36.9%	23.2%
Persons with a disability, age 5+, 2000	46,724	3,605,542
Mean travel time to work (minutes), workers age 16+, 2000	32.3	25.4
Housing units, 2009	162,589	9,724,251
Homeownership rate, 2000	80.8%	63.8%
Housing units in multi-unit structures, percent, 2000	9.3%	24.2%
Median value of owner-occupied housing units, 2000	$115,100	$82,500
Households, 2000	110,915	7,393,354
Persons per household, 2000	3.14	2.74
Median household income, 2008	$83,968	$50,049
Per capita money income, 1999	$24,985	$19,617
Persons below poverty level, percent, 2008	8.0%	15.8%

Business QuickFacts	Fort Bend County	Texas
Private nonfarm establishments, 2007	8,397	521,408[1]
Private nonfarm employment, 2007	110,038	9,041,030[1]
Private nonfarm employment, percent change 2000-2007	39.9%	12.6%[1]
Nonemployer establishments, 2007	44,016	1,819,963
Total number of firms, 2002	33,167	1,734,509
Black-owned firms, percent, 2002	13.9%	5.1%
American Indian and Alaska Native owned firms, percent, 2002	S	0.9%
Asian-owned firms, percent, 2002	13.4%	4.5%
Native Hawaiian and Other Pacific Islander owned firms, percent, 2002	F	0.1%
Hispanic-owned firms, percent, 2002	S	18.4%
Women-owned firms, percent, 2002	27.6%	27.0%

Manufacturers shipments, 2002 ($1000)	2,620,576	310,815,965
Wholesale trade sales, 2002 ($1000)	7,621,754	397,405,111
Retail sales, 2002 ($1000)	3,384,276	228,694,755
Retail sales per capita, 2002	$8,486	$10,528
Accommodation and foodservices sales, 2002 ($1000)	350,729	29,914,774
Building permits, 2009	5,425	84,440
Federal spending, 2008	1,135,932	210,004,633[1]
Geography QuickFacts	**Fort Bend County**	**Texas**
Land area, 2000 (square miles)	874.64	261,797.12
Persons per square mile, 2000	405.1	79.6
FIPS Code	157	48
Metropolitan or Micropolitan Statistical Area	Houston-Sugar Land-Baytown, TX Metro Area	

1: Includes data not distributed by county.

(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.

D: Suppressed to avoid disclosure of confidential information
F: Fewer than 100 firms
FN: Footnote on this item for this area in place of data
NA: Not available
S: Suppressed; does not meet publication standards
X: Not applicable
Z: Value greater than zero but less than half unit of measure shown

Source U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, Census of Population and Housing, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits, Consolidated Federal Funds Report
Last Revised: Monday, 16-Aug-2010 08:50:05 EDT

ATTACHMENT 6

PAST STUDY EFFORTS

Summaries of Past Study Efforts in the Gapps Bayou and Rabbs Bayou Watersheds

r. g. miller
engineers

Channel Name	Channel #	Development	Description	Entity	Engineer	Date	File #
Gapps Slough	II-B-2-a	Summer Lakes	Hydrologic and Hydraulic Analysis of Gapps Slough Watershed	FBC MUD #144	Edminster Hinshaw Russ	Apr-04	GAPPS-00369
Gapps Slough	II-B-2-a	Summer Gardens	Drainage and Detention Analysis for Summer Gardens Subdivision	FBC MUD #158	Edminster Hinshaw Russ	Sep-04	GAPPS-00364
Gapps Slough	II-B-2-a	Bonbrook Plantation	Master Drainage Plan for Bonbrook Plantation Development	FBC MUD #155	LJA Engineering	Jan-05	GAPPS-00385
Gapps Slough	II-B-2-a	Bridlewood, Section 4	Hydrologic and Hydraulic Analysis	N/A	TEAM	Jul-98	GAPPS-00028
Gapps Slough	II-B-2-a	Summer Creek	Drainage Study (189.8 acre tract - Oshman Tract)	FBC MUD #144	4Site Engineering	Mar-05	GAPPS-00387
Gapps Slough	II-B-2-a	Bridlewood Estates, Sections 1, 2, & 3	Hydrologic and Hydraulic Study	N/A	TEAM	Aug-97	GAPPS-00342
Gapps Slough	II-B-2-a	Royal Lakes Estates	Hydrologic and Hydraulic Analysis	N/A	Dodson	Oct-98	GAPPS-00027
Gapps Slough	II-B-2-a	Royal Lakes Manor	Report on Hydrologic and Hydraulic Analyses	N/A	Dodson	Jun-04	GAPPS-00365
Gapps Slough	II-B-2-a	River Run at the Brazos	Drainage and Detention Analysis for the Ultimate Development	FBC MUD #158	EHR	Sep-06	GAPPS-00426
Gapps Slough	II-B-2-a	Rivers Mist	Drainage and Detention Analysis for the Ultimate Development	FBC MUD #158	EHR	Sep-06	GAPPS-00426
Guyler Ditch	II-BB	Twinwood (FM 1489)	Section One Drainage Plan	N/A	James Suchma, P.E. Inc	Dec-96	GAPPS-00341
Guyler Ditch	II-BB	Twinwood (FM 1489)	Master Development Plan	FBCDD	EHA	Nov-84	GUYLER-00279
Guyler Ditch	II-BB	Twinwood (FM 1489)	Summary of Drainage Analysis for Twinwood	FBCDD	EHA	Oct-88	GUYLER-00280
Hady Creek (Bessies Creek)	II-F-2	TxDOT Bridge Replacement	Discharge Point and HEC runs	FBCDD	EHA	Aug-84	GUYLER-00281
Internal Ditches	N/A	New Territory	Hydraulic Analyses for Mullins Lane at Bessie's Creek	TxDOT	Sirrus Engineers	May-06	BRAZOS-00439
Internal Ditches	N/A	New Territory	LID #7 Ultimate Channel Design Hydraulic Profile Printouts	FBC LID #7	VMK	Sept-93	BULLHD-00105
Jones Creek	II-E	Sendero 932 Acre Tract	LID #7 Localized Ponding to Determine Ponding for Initial Dev. & No. Pumps	FBC LID #7	VMK	Feb-85	BULLHD-00106
Jones Creek	II-E	FM 359 Widening	Drainage Analysis of 932 Acre Tract		Costello	Nov-06	JONES-00449
Jones Creek	II-E	Rio Vista	FM 359 Preliminary Drainage Study	TxDOT	Aguirre & Fields	Mar-05	JONES-00436
Jones Creek	II-E	Long Meadow Farms	Storm Sewer Outfall into Jones Creek and Mechanically Stabilized Earth Gabion Retaining Wall	FBC MUD #145	Edminster Hinshaw Russ	Mar-07	JONES-00473
Jones Creek	II-E	Fort Bend County Drainage District	Drainage Analysis for the development of 63 acres within Long Meadow Farms Subdivision	FBC MUD #146	Costello	Aug-04	JONES-00352
Jones Creek	II-E	Middleton-McCrary Tract	Master Drainage Study - Future Conditions HEC-1 (Jones Creek to FM 1464)	FBCDD	EHA	Nov-87	OYSUPP-00282
Jones Creek	II-E	Westcreek Subdivision	Drainage Study of 970 acres (Canal and Precinct Line Road)	N/A	VMK	Jan-85	JONES-00217
Jones Creek	II-E	TxDOT Bridge Replacement	Drainage Impact Analysis for the Proposed 53 acre WestCreek Subdivision	N/A	CSE	Sep-04	JONES-00358
Jones Creek	II-E	Fort Bend County Drainage District	Hydraulic Analyses for Empress Lane at Jones Creek	TxDOT	Sirrus Engineers	May-06	BRAZOS-00439
Jones Creek	II-E	Fort Bend County Drainage District	Master Drainage Study - Future Conditions HEC-1 (FM 1464 to Brazos River)	FBCDD	EHA	Nov-87	OYSUPP-00282
Jones Creek	II-E	Fort Bend County Drainage District	Drainage Study of Jones Creek Watershed - Volume 2 of 2 (2 COPIES)	FBCDD	A.I. Assoc.	Sep-93	JONES-00219
Jones Creek	II-E	Fort Bend County Drainage District	Drainage Study of Jones Creek Watershed - Volume 1 of 2 (2 COPIES)	FBCDD	A.I. Assoc.	Sep-93	JONES-00218
Jones Creek	II-E	Fulshear Ranch	Master Drainage Study - Present Conditions HEC-2 Printouts	FBCDD	EHA	Nov-87	JONES-00261
Jones Creek	II-E	Pecan Grove Plantation	Master Drainage Study - Present Conditions HEC-1 and Storage/Discharge Printout	FBCDD	EHA	Nov-87	JONES-00260
Jones Creek	II-E	Fort Bend County Drainage District	Prelim Drainage Study for Fulshear Ranch, Grassy Lake, Allen, Tartar & Rose Tracts	FBCDD	VMK	Dec-85	FULSHR-00288
Jones Creek	II-E	Fort Bend County Drainage District	Specifications and Contract Documents for Drainage Imp's for Pecan Grove MUD	Pecan Grove MUD	Jones & Carter	Feb-87	JONES-00262
Jones Creek	II-E	Sprint Regional FM 1093 Detention Sy	Master Drainage Study - Future Conditions HEC-1 (Jones to Brazos - Alt. Plans)	FBCDD	EHA	Nov-87	OYSUPP-00282
			Master Drainage Study - Future Conditions Printouts	FBCDD	EHA	Nov-87	JONES-00262
			Regional Detention Analysis	N/A	Provident Engineers	Sep-04	JONES-00366

Channel Name	Channel #	Development	Description	Entity	Engineer	Date	File #
Oyster Creek	III	Highway 90-A Improvements	Drainage Impact Analysis - US 90A Project from Spur 41 to Oyster Creek	TxDOT	Dodson	Aug-04	OYSTER-00373
Oyster Creek	III	Aliana Development	Master Drainage Plan		LJA Engineering	Sep-06	OYSTER-00427
Oyster Creek	III	Voss Road	Preliminary Engineering Report for Reconstruction of Voss Road (Old Richmond Rd to Hwy 6)	Fort Bend County	Thompson	Nov-04	OYSTER-00390
Oyster Creek	II-K	Fort Bend County Drainage District	Master Drainage Study - Existing Conditions HEC-2 Printout	FBCDD	EHA	Nov-87	OYSMID-00267
Oyster Creek Lateral	III-C	Vicksburg	Drainage Analysis of the Vicksburg Ditch System	FBC MUD #48	Jones & Carter	Jun-02	OYSMID-00433
Rabbs Bayou	II-D	Lakes at Williams Ranch	Lakes at Williams Ranch and Canyon Lakes Developments Drainage Analysis		R G Miller	Dec-04	RABBS-00396
Rabbs Bayou	II-D	City of Richmond	Hydraulic Study for Lamar Drive Drainage Improvements	City of Richmond	CSE	Oct-06	RABBS-00450
Rabbs Bayou	II-D	Fort Bend County Drainage District	Rabbs Bayou Ultimate Drainage Plan	FBCDD	FBCDD	Sep-89	RABBS-00289
Rabbs Bayou	II-D	Greatwood	LID #11 Master Drainage Study Present and Future Conditions HEC-1 & 2	FBC LID #11	EHA	Nov-87	RABBS-00158
Rabbs Bayou	II-D	Middle Bayou 116-Acre Development	Proposed 116-Acre Development on Middle Bayou Hydrologic and Hydraulic Analysis	FBCDD	Dodson	May-02	RABBS-00326
Rabbs Bayou	II-D	Canyon Lakes at the Brazos Section 2	Drainage Analysis for Section 2 (2 COPIES)	FBC MUD #116	RG Miller	Nov-04	RABBS-00355
Rabbs Bayou	II-D	Fort Bend County Drainage District	Master Drainage Study Present Conditions HEC-1 and Storage	FBCDD	EHA	Nov-87	RABBS-00285
Rabbs Bayou	II-D	Greatwood	Prelim Engineering Report on the Joint Levee and Diversion of Middle to Rabbs	FBC LID #11	EHA	Nov-87	RABBS-00161
Rabbs Bayou	II-D	Highway 59	Drainage and Impact Analysis Report for US 59 (SH 99 to FM 762) 2 Volumes	TxDOT	PBS&J	Jun-04	RABBS-00412
Rabbs Bayou	II-D	Highway 59	Drainage Impact Analysis for US 59 (Seabourne Creek to 1800' East of Reading Road)	TxDOT	Thompson Group	Jul-04	DRYCR-00413
Rabbs Bayou	II-D	Oakbend Hospital	Drainage Analysis for 16.6 acre Oak Bend Hospital Site		RG Miller	Mar-08	RABBS-00495
Rabbs Bayou	II-D	Villages of Rosenberg	Drainage Report for Villages of Rosenberg	FBC MUD #167	Dannenbaum	Jan-05	RABBS-00388
Rabbs Bayou	II-D	Del Webb	Drainage Study for Caldwell Companies Pyle Development (2 COPIES)		Lippke Cartwright & Robert	Feb-08	RABBS-00497
Rabbs Bayou	II-D	Brazos Town Center	Drainage Study for Brazos Town Center Phase 2 Residential Development in Rosenberg	NewQuest Properties	Lippke Cartwright & Robert	Jul-06	RABBS-00468
RABBS BAYOU	II-D	BRAZOS TOWN CTR PH. 2	REVISED DRAINAGE STUDY	FBC MUD 167		OCT 06	RABBS-00?
Rabbs Bayou	II-D	Greatwood	Engineer's Report Plan of Reclamation for LID #11 Appendix B Computer Models	FBC LID #11	EHA	Jul-88	RABBS-00157
Rabbs Bayou	II-D	Greatwood	Request for CLOMR	FBC LID #11	EHA	Jul-88	RABBS-00163
Rabbs Bayou	II-D	City of Richmond & FBCDD	Upper Rabbs Bayou Drainage Study (8 COPIES)	City of Richmond	Suchma	Nov-95	RABBS-00152
Rabbs Bayou	II-D	Greatwood	Geotechnical Study for Perimeter Levee System	FBC LID #11	McBride-Ratcliff	Jun-88	RABBS-00160
Rabbs Bayou	II-D	Canyon Gate at the Brazos	Hydrologic Impact Analysis for 2 Tracts Adjacent to the Greatwood Development		Dodson	Jul-98	RABBS-00153
Rabbs Bayou	II-D	Fort Bend County Drainage District	HEC-1 Existing Conditions Computer Printout	FBCDD	?	Mar-95	RABBS-00154
Rabbs Bayou	II-D	Fort Bend County Drainage District	HEC-2 Existing Conditions Computer Printout	FBCDD	?	Mar-95	RABBS-00155
Rabbs Bayou	II-D	Pyle Tract	Drainage Study for Caldwell Companies Pyle Development in City of Richmond ETJ	N/A	Lippke Cartwright Roberts	Aug-07	RABBS-00483
Rabbs Bayou	II-D	Tara	Drainage Study for Development of 140 acres	Plantation MUD	PM&E	Nov-82	RABBS-00156
Rabbs Bayou	II-D	Lakes at Williams Ranch	US 59 / Lakes at Williams Ranch Drainage Channel Realignment		R G Miller	Apr-05	RABBS-00395
Rabbs Bayou Lateral	II-D-11	Reading Road Joint venture (295 acs)	Prelim Engineering Report	FBC MUD #31	Dannenbaum	Nov-86	RABBS-00213
Rabbs Bayou Lateral	II-D-11	Highway 59 - Reading Road Frontage	US 59/Reading Road Frontage Roads FM 2218 to FM 762 Drainage Study	TXDOT	HNTB Corp.	Dec-98	DRYCR-00256
Red Gully	II-K-9	Four Corners Area	Hydrologic and Hydraulic Analysis for Detention Facilities to serve W Bellfort Ext & Four Corners	Fort Bend County	Kaluza & Assoc	Apr-07	REDGLY-0046
Red Gully	II-K-9	Stratford Park Village	Hydrologic Models for Detention Analysis	FBC MUD #25 & 41	Costello	Jul-96	REDGLY-0047
Red Gully	II-K-9	Fort Bend County Drainage District	Master Drainage Study Existing Conditions HEC-2	FBCDD	EHA	Nov-87	OYSUPP-0030
Red Gully	II-K-9	West Bellfort Extension	Hydrologic and Hydraulic Analysis for Detention Facilities to serve W Bellfort Ext & Four Corners	Fort Bend County	Kaluza & Assoc	Apr-07	REDGLY-0046

ATTACHMENT 7

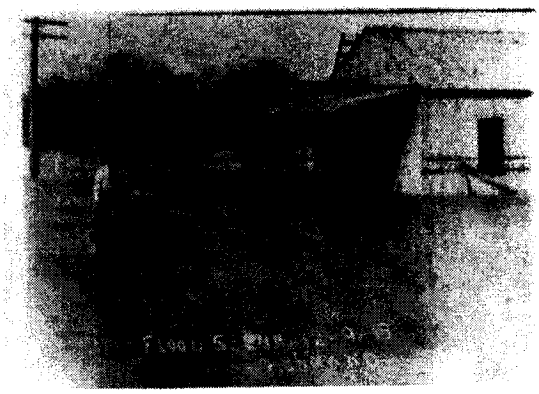
PAST FLOODING

Information on Past Flooding in the General Project Area

r. g. miller engineers

Nothing compares to the flood of 1913

by Chris Godbold, **published** December 23, 2009 9:49 am
http://www.ultimatefortbend.com/stories/3803-nothing-compares-to-the-flood-of-1913



1913 Flood in Richmond

The recent rainy days have brought to mind the floods of 1899, 1913 and 1922 in Fort Bend County. Centered between the Colorado and Brazos rivers, most of the lower elevations of the county have been susceptible to flooding. This was especially true in 1913 when water backed up to the sewer at the corner of 3rd street and Avenue G in Rosenberg and covered every vestige of land from the depot to the high land beyond Jones Creek. Fortunately, few lives were lost and few crops were destroyed. December 6, 1913 brought with it a storm that came down from the north adding to the upper reaches of the Brazos, San Bernard and Colorado rivers. Rain kept falling, with many places recording as much as 12 inches of rain. This water flowed downstream and added to the water the storms continued to rain on the county as they moved south. River levels in the county began to rise, but not to the point that the lower elevations had flooded. However, people living in those areas were warned to evacuate themselves and their livestock. On December 7, the very low places began to flood and rescue crews were dispatched to Hungerford, in Wharton County. Those crews returned the next day after saving several lives. December 8 saw the Brazos near its high stage and flood the low areas east and north of Rosenberg. Runners were again sent to warn people in the lowlands to evacuate. A Santa Fe train with seven lifeboats arrived with two being assigned to Rosenberg, one to Sugar Land, one to Orchard, and three to Richmond. Despite this, citizens of Rosenberg and Richmond were not worried as the majority of their cities were high enough above the Brazos to avoid floodwaters. The Brazos rose 10 feet from Dec. 7 to Dec. 8, with waters still rising and spreading into the surrounding countryside. On December 9, the Brazos was a swirling, seething flow, carrying with it rooftops, timbers, and other debris. The water began to back up in the gulches and gullies, eventually standing a few feet below the train depot. In addition, the Creamery, Brazos Brick and Tile Co. plant, and old Dunbar saw mill were flooded. Boats patrolled the river looking for people adrift in the water. Another relief train rescued fifty people between Sugar Land and Harlem. Businesses in Rosenberg were suspended so that everyone could take part in the rescue and relief efforts. By nightfall the waters stood five feet below the bottom of the steel wagon bridge and two feet below the depot. The northern horizon was water as far as the eye could see with depths ranging from 3 to 7 feet. The flood



Flood waters at Brazos River Bridge

was said to extend in an unbroken stretch for 12 miles between Richmond and Sugar Land, even flooding the depot in Sugar Land. Numerous people were trapped in their homes in the lower areas along the Brazos. The waters crested and then quickly fell on December 10, sparing downtown Richmond and Rosenberg from inundation. However, in the portions of town north of the railroad tracks, water rose to the second story of homes. Several boats were launched into the River to look for survivors. All transportation to the area was cut off, except for a special train out of Rosenberg. The flood waters then targeted Crabb, Booth, and Thompsons, inundating the railroad track, but killing few people as most fled to safety in advance of the flood. Oyster Creek also overflowed its banks. Offers of assistance came in from Galveston, Houston, and other surrounding communities. On December 11, the waters continued to recede, clearing the railroad tracks to the west and allowing trains to come in from that direction. Relief supplies and assistance arrived in the area and repairs to area infrastructure began. In the days following, the hundreds of people that took refuge in Richmond and Rosenberg started returning to what was left of their homes and began to rebuild. Lime was shipped in to prevent typhoid, silt was cleared away, and wood was gathered both for rebuilding and for fuel. Regular trains began to run on Dec. 17 and conditions returned to normal shortly thereafter, but those who lived through the events of December 1913, never forgot the raging waters or the tireless efforts of the rescuers.

Duane Barrett

From: Jeffrey Janecek [janecjef@co.fort-bend.tx.us]
Sent: Monday, August 16, 2010 4:50 PM
To: Duane Barrett
Subject: Re: Flooding Locations in Southern and Western Fort Bend County

Attachments: OWMap.jpg



OWMap.jpg (557 KB)

Mr. Oberhoff's property is on the west side of Gerken Rd. If you are traveling north on Gerken Rd. it is the third house on the left past Fenske Rd.

The property that Mr. Bennie Wleczyk has drainage issues on is located on the south side of Armstrong Rd. If you are traveling west on Armstrong you cross Cedar Creek and it is about a mile down on the left hand side. It's primary use is agricultural land and the south side of the road is actually Brazoria County. His thoughts are that the problem is coming off of the Moore property on the north side of the road and Fort Bend County. He and his son farm the property and both of them live in Rosenberg and FBC Pct. 1.

There is also a Steve Wleczyk that we hear from every now and then, but Bennie is the one we've dealt with lately so I think he is who you are interested in. Let me know if you need more info on Steve W.

Put together a quick jpeg to show the locations. O is Oberhoff, W is Wleczyk.

Call if you have any other questions.

Thanks,

Jeff Janecek
Fort Bend County Drainage District
(281) 342-2863

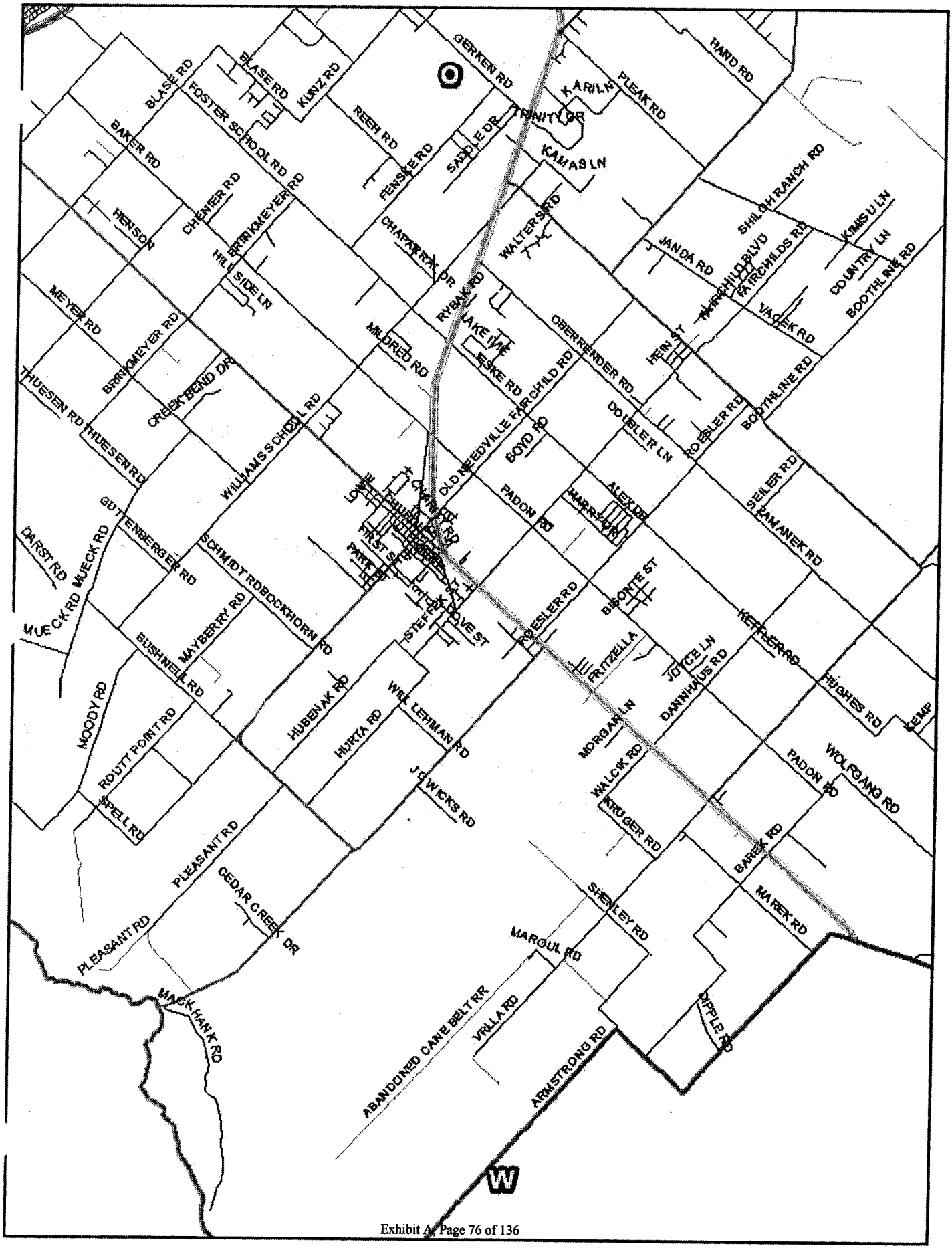
>>> Duane Barrett <DBarrett@rgmiller.com> 8/16/2010 4:11 PM >>>
Jeff:

Can you tell me roughly where the Oberhoff and Wleczyk properties are located? I'm trying to locate some of the flooding areas that you and Mark have described to me and would like to identify these two. I don't need a precise location, and I won't call out these names on any exhibits, as I don't want to invade their privacy or create any adverse effects on property values. If I can just get an approximately location, that would be great.

Thanks!

Duane

Duane Barrett, P.E.
R.G. Miller Engineers, Inc.
dbarrett@rgmiller.com
713-461-9600


GERKEN RD
BLASE RD
KLINZ RD
FOSTER SCHOOL RD
REEH RD
FENSKE RD
SADDLE DR
TRINITY DR
KARILN
PLEAK RD
HAND RD
KAMAS LN
BAKER RD
CHENIER RD
HENSON
ERTRIKMEYER RD
CHAPPELL DR
WALTER SRD
SHILOH RANCH RD
JANDA RD
FAIRCHILDS BLVD
FAIRCHILDS RD
KIMSU LN
COUNTRY LN
BOOTHLINE RD
VASEK RD
HILLSIDE LN
MEYER RD
BRINKMEYER RD
RYBAK RD
LAKE IVE
ESKE RD
MILDRED RD
OBERRENDER RD
HEIN ST
CREEKBEND DR
THUESEN RD
THUESEN RD
WILLIAMS SCHOOL RD
DOUBLER LN
DOUBLER RD
BOYD RD
OLD NEEDVILLE FAIRCHILD RD
SEILER RD
LOWE
CHURCH ST
PADON RD
HARRISON
ALEX DR
KAMANEK RD
GUTTENBERGER
DARST RD
WUECK RD
WUECK RD
SCHMIDT RD
BOCKHORN RD
FIRST ST
PARK ST
STEFFEK
DAVEST
BISONTE ST
FRITZELLA
JOTGE LN
DANNHAUS RD
KEITHER RD
HUGHES RD
KEMP
BUSHNELL RD
MAYBERRY RD
MOODY RD
HUBENAK RD
HURTA RD
WM LEHMAN RD
MORGAN LN
WALCIK RD
KRUGER RD
PADON RD
WOLFGANG RD
ROUTT POINT RD
SPELL RD
J C WICKS RD
PLEASANT RD
CEDAR CREEK DR
PLEASANT RD
BAREK RD
MAREK RD
SHENLEY RD
MAROUL RD
MACK HANK RD
ABANDONED CANE BELT RR
VRLLA RD
ARMSTRONG RD
DIPPLE RD
W

ATTACHMENT 8

PETITION

Petition from Residents of Bridlewood Estates
Sections 1-4

r.g. miller
engineers

FORT BEND COUNTY COMMISSIONERS COURT

PUBLIC PARTICIPATION FORM

3 MINUTE TIME LIMIT

PLEASE FILL OUT ALL APPROPRIATE BLANKS.
PLEASE PRINT OR WRITE LEGIBLY.

NAME: Peter A Douglas

HOME ADDRESS: 6119 Bridlewood Dr
Richmond, Tx 77469

HOME PHONE: (281) 341-0123

PLACE OF EMPLOYMENT: American Pipe Fab

WORK PHONE: (713) 721-4700

DO YOU REPRESENT ANY PARTICULAR GROUP /ORGANIZATION? Yes

IF YOU DO REPRESENT A GROUP/ORGANIZATION, PLEASE STATE THE NAME, ADDRESS AND PHONE NUMBER OF SUCH GROUP/ORGANIZATION

Bridlewood Property Owners Association
Richmond Tex 77469 (281) 341 0123

WHICH AGENDA ITEM DO YOU WISH TO ADDRESS? 4

IN GENERAL, ARE YOU FOR OR AGAINST SUCH AGENDA ITEM? For

SIGNATURE Peter A Douglas

NOTE: THIS PUBLIC PARTICIPATION FORM MUST BE PRESENTED TO THE COUNTY CLERK OR COUNTY JUDGE PRIOR TO THE TIME THAT THE AGENDA ITEM YOU WISH TO ADDRESS ARE DISCUSSED BEFORE THE COURT. NOTE: 3 MINUTE TIME LIMIT.

4

PETITION

WE THE UNDERSIGNED, ALL OF WHICH ARE RESIDENTS AND/OR HOME OWNERS IN BRIDLEWOOD ESTATES, SECTION 1, 2, 3, AND 4, OF FORT BEND COUNTY, TEXAS, REQUEST THAT THE BOARD OF DIRECTORS OF BEPOA RETAIN A LICENSED, BY THE STATE OF TEXAS, PROFESSIONAL ENGINEERING FIRM TO PERFORM THE FOLLOWING:

1. REVIEW THE APPROVED PLAT, COUNTY SPECIFICATION AND CONSTRUCTION DRAWING OF BRIDLEWOOD ESTATES SECTION 1, 2, 3, AND 4.

2. VERIFY THROUGH SURVEY AND TESTING THAT THE AFOREMENTIONED DRAWINGS AND SPECIFICATIONS HAVE IN FACT BEEN ADHERED TO.

3. CERTIFY TO THE PROPERTY OWNERS ASSOCIATION, THAT WITHIN REASON, THE DESIGN CRITERIA HAS BEEN SATISFIED.

WE ARE MAKING THIS REQUEST THROUGH PETITION FOR THE FOLLOWING REASONS:

1. THE DEPLORABLE CONDITIONS OF THE ROADWAYS, SPECIFICALLY IN SECTIONS 1, 2, AND 3, PARTICULARLY THE VISUAL FAILURE OF THE ROAD SHOULDERS IN AND ON ALL ROADS OF THE SUBDIVISION.

2. FAILURE OF DRAINAGE FLOW TO REMOVE STANDING WATER FROM DITCHES AND COMMON GROUNDS THROUGHOUT THE SUBDIVISION. AS YOU KNOW THIS CONDITION PROMOTES THE BREEDING AND PROLIFERATION OF INSECTS, KNOWN TO CARRY A VIRUS, THAT MAY BE HARMFUL TO RESIDENTS, ESPECIALLY YOUNG CHILDREN AND THE ELDERLY.

FURTHERMORE, TO INTERCEDE FOR THE BENEFIT OF ALL PROPERTY OWNERS ASSOCIATION MEMBERS, TO THE FORT BEND COUNTY COMMISSIONERS COURT, THAT THEY NOT ACCEPT ANY PORTION OF BRIDLEWOOD ESTATES ROADS OR DRAINAGE, AT THIS TIME.

WE PRAY THAT THE BOARD OF DIRECTORS ACT UPON THE REQUESTS OF THE UNDERSIGNED RESIDENTS OF BRIDLEWOOD ESTATES, RICHMOND, TEXAS.

July 5, 2000

I, **Peter A. Douglas**, 6119 Bridlewood Drive, Richmond, Texas 77469, certify that I am in possession of the Original Petition concerning Roads and Drainage in Bridlewood Estates There are a total of six (6) signed pages as of this date These pages are exact copies of the originals

Peter A Douglas Date

State of Texas
County of FortBend

Peter A. Douglas, personally appeared before me, and being first duly sworn declared that he signed this application in the capacity designated, if any, and further states that he has read the above application and the statements therein contained are true

Sworn to and subscribed before me this 7th day of July, 2000

SUZANNE MASON
MY COMMISSION EXPIRES
October 11, 2000

Notary Public Signature

PETITION SIGNATURES

NAME	ADDRESS	PHONE # (NOT REQUIRED)
Pam Walters	1323 Chapel	281-344-8424
Lisa Rose	1315 Chapel Bay	281-344-8374
[illegible]	1315 Chapel Bay	281-344-8374
[illegible]	5819 Bridlewood DR.	281-342-0754
[illegible]	5818 Bridlewood DR	281-342-0754
[illegible]	5835 Bridlewood DR.	281-344-9117
[illegible]	5835 Bridlewood Dr	281 344 9117
[illegible]	5834 BRIDLEWOOD DR.	(281) 342-6437
Sharon Taylor	5834 Bridlewood Dr.	281-3426437
Byrnice Christ		
Kelly Dunford	6727 Rustling Oaks	281-633-9557
Frances Holbrook	9903 S Bridlewood	(281) 344-0404
Marguerite Moore	6010 Bridlewood Drive	(281) 238-4445
Ben Moore	6010 Bridlewood Drive	(281) 238-4445
Chi Lam	6019 Bridlewood Dr.	(281) 633-2808
Henry Lam	6019 Bridlewood DR	(281) 633-2808
[illegible]	6103 Bridlewood Dr	281-344-9453
[illegible]	6103 Bridlewood Dr.	281-344-9453
Willie W. Lee	6111 Bridlewood Dr	281 239 2884
Theresa Lee	6111 Bridlewood Dr.	281 239 2884
Christine Palmarejo	7103 Rustling Oaks	281-344-8877
Ed Palmarejo	7103 Rustling Oaks	281-344-8877
Ellen Clayton	6511 Bridlewood	281-341-8307
[illegible]	6430 Bridlewood Dr	281-232-3570
Ronnie J. Huckaby & Huckaby	6430 Bridlewood Dr	281-232-3570

PD/ST

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Page

PETITION SIGNATURES

NAME	ADDRESS	PHONE # (NOT REQUIRED)
[signature]	7102 Rustling Oaks DR.	
Brigette Towns	7102 Rustling Oaks	
Jan Bouchard	6119 Sunnyside Ct	
[signature]	6119 Sunnyside Ct	
Pat Murphy	6318 BRIDLEWOOD DR.	
[signature]	6318 Bridlewood Dr.	
[signature]	6119 Bridlewood Dr	281-341-0123
[signature]	6119 Bridlewood Dr.	281-341-0123
[signature]	6203 Bridlewood Dr.	281-341-8277
[signature]	5902 Evening Sun Ct	281-633-9179
[signature]	5927 EVENING SUN CT	281-238-0877
[signature]	6003 EVENING SUN CT	281-344-8182
Debra K Bennett	6003 Evening Sun Ct	281-344-8182
[signature]	9903 So BRIDLEWOOD	281-344-0404
[signature]	6503 Bridlewood Dr.	281-633-0856
[signature]	6427 BRIDLEWOOD DR.	281 3449592.
[signature]	6427 Bridlewood Dr	281 3449592
[signature]	6414 Bridlewood Dr	281-232-4428
Robyn Williams	6414 Bridlewood Dr	281/232-4428
[signature]	7402 Rustling Oaks Dr	281 258-0581
[signature]	7402 Rustling Oaks Dr	281-258-0581
[signature]	10012 Rowdy Rd	281-633-0202
[signature]	10018 Rowdy Rd	281-633-0202
Gloria Stanzak	6211 Bridlewood Dr	281-343-5930
Lauren R Stanzak	6211 Bridlewood Dr	281-342-5930

PD

Peter R Douglas

PETITION SIGNATURES

NAME	ADDRESS	PHONE # (NOT REQUIRED)
Linda Kulbjian	5803 Bridlewood Dr	2812329926

PAGE 3

PD

PETITION SIGNATURES

NAME	ADDRESS	PHONE # (NOT REQUIRED)
	7202 SAVANNAH GLEN LANE	281-341-9176
Cathrin Smith Ofela	7202 Savannah Glen Ln	281-341-9176
	6435 Carriage Wood Ct.	281-633-2321
	6435 Carriage Wood Ct	281-633-2321
	7211 Savannah Glen Ln	281-788-4324
Michelle Locke	7227 SAVANNAH GLEN LN	281-341-0919
Eileen Haydon Akson	7303 Savannah Glen Lane	713 753-3454 GW
	7310 Savannah Glen Ln	281-344-1208
by Shaina Liebelman	7310 Savannah Glen	281-344-1208

KH

PAGE 4

PETITION SIGNATURES

NAME	ADDRESS	PHONE # (NOT REQUIRED)
S O Wilkes	7319 Rustling Oaks Dr	281-238-5222
Debby Sauve	7219 Rustling Oaks Dr	281-238-5222
Laura A Lopez	7326 Rustling Oaks Dr.	281-238-4533
Laura D Lopez	7203 RUSTLING OAKS DR	281-384-8889
Harold T Jackson	7210 Rustling Oaks Dr.	281-238-0260
[illegible]	7302 Rustling Oaks Dr	281-238-4400

DB

PAGE 5

PETITION SIGNATURES

NAME	ADDRESS	PHONE # (NOT REQUIRED)
Larry L Hale	6203 Bridlewood	281-341-8277
Ted R Smith	7202 Rustling Oaks	281-288-8059
Thomas Bailey	6630 Flowermound	281-343-0269

P.D.

ATTACHMENT 9

FLOODING PHOTOS

Flooding Photos for the Bridlewood Estates Subdivision

r. g. miller
engineers

FLOODING PHOTOS OF THE BRIDLEWOOD AREA







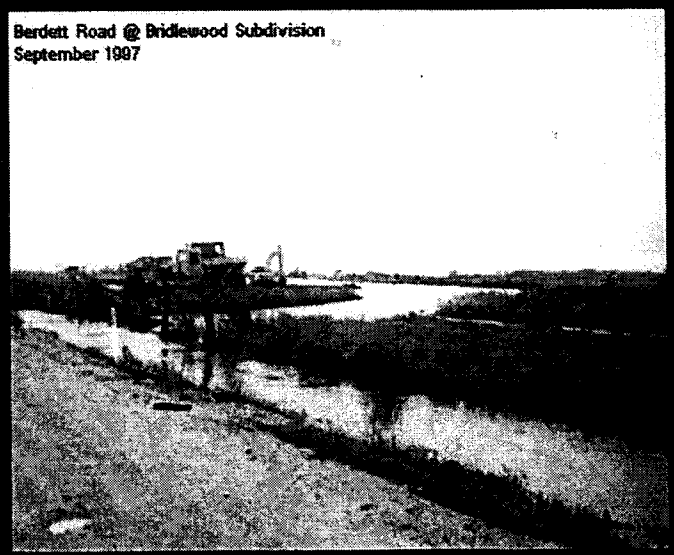


FLOODING PHOTOS OF THE BRIDLEWOOD AREA









FLOODING PHOTOS OF THE BRIDLEWOOD AREA







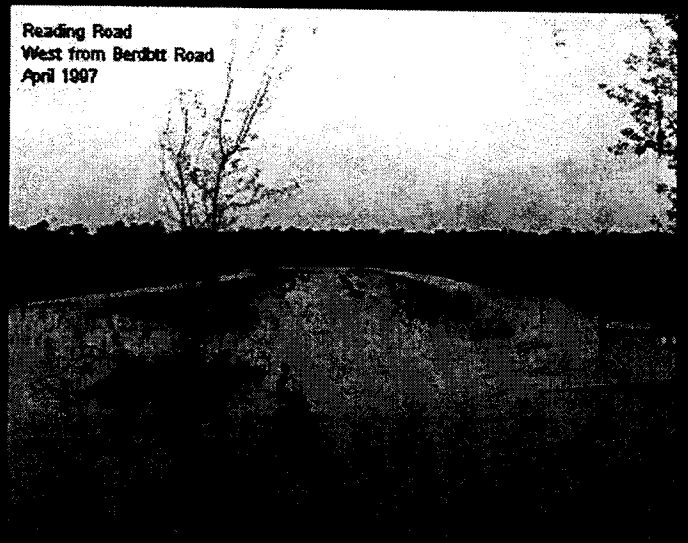
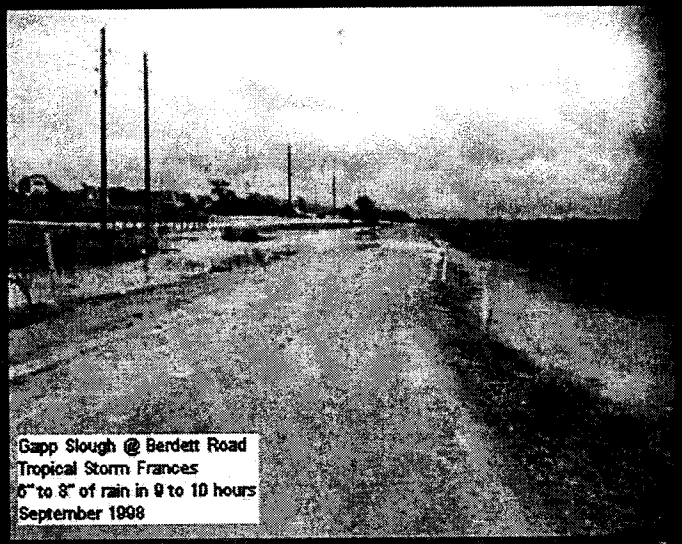
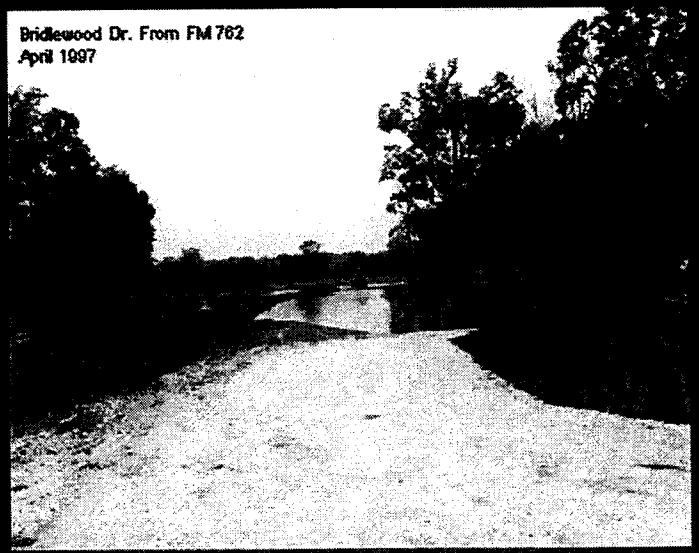
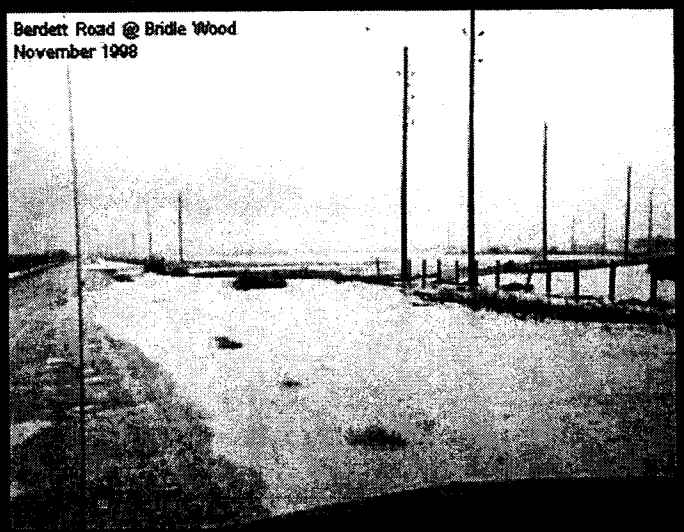


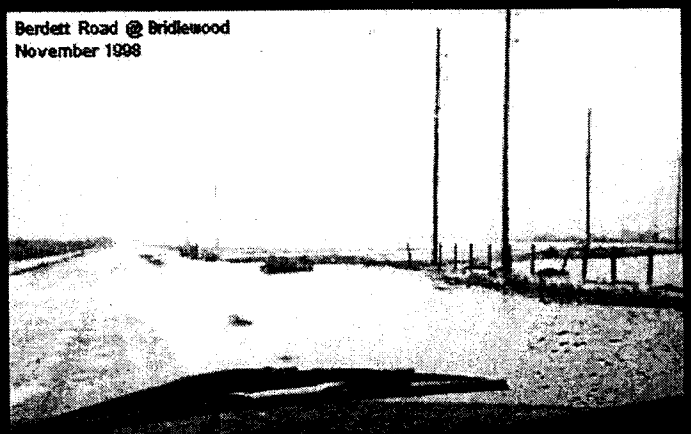
Exhibit A, Page 90 of 136

FLOODING PHOTOS OF THE BRIDLEWOOD AREA

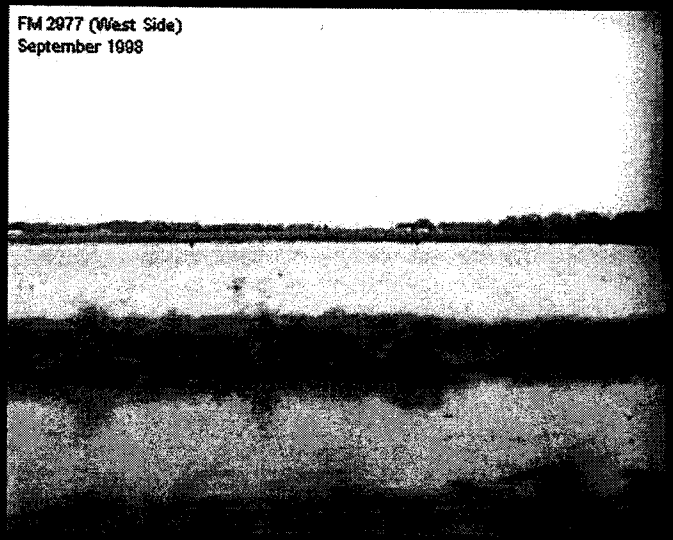








FLOODING PHOTOS OF THE BRIDLEWOOD AREA



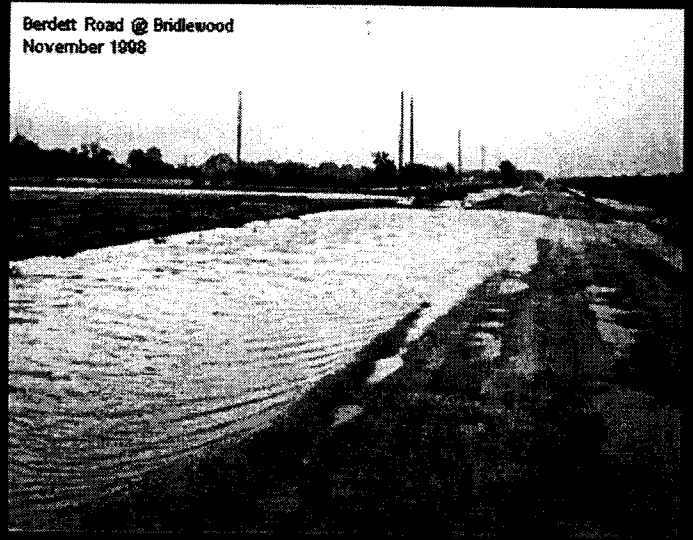


Exhibit A, Page 92 of 136

ATTACHMENT 10

MAPS & EXHIBITS

Maps & Exhibits for the Proposed Project Area

r. g. miller
engineers



DRAINAGE AREA MAP

r.g. miller engineers
12121 Wickchester Lane - Suite 200
Houston, Texas 77079
Texas Firm Registration No. F-487



RABBS BAYOU
DRAINAGE BOUNDARY

r.g. miller engineers
12121 Wickchester Lane - Suite 360
Houston, Texas 77079
Texas Firm Registration No. F-487

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross-sections and interpolated between cross-sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Texas State Plane south central zone (FIPSZONE 4204). The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov.

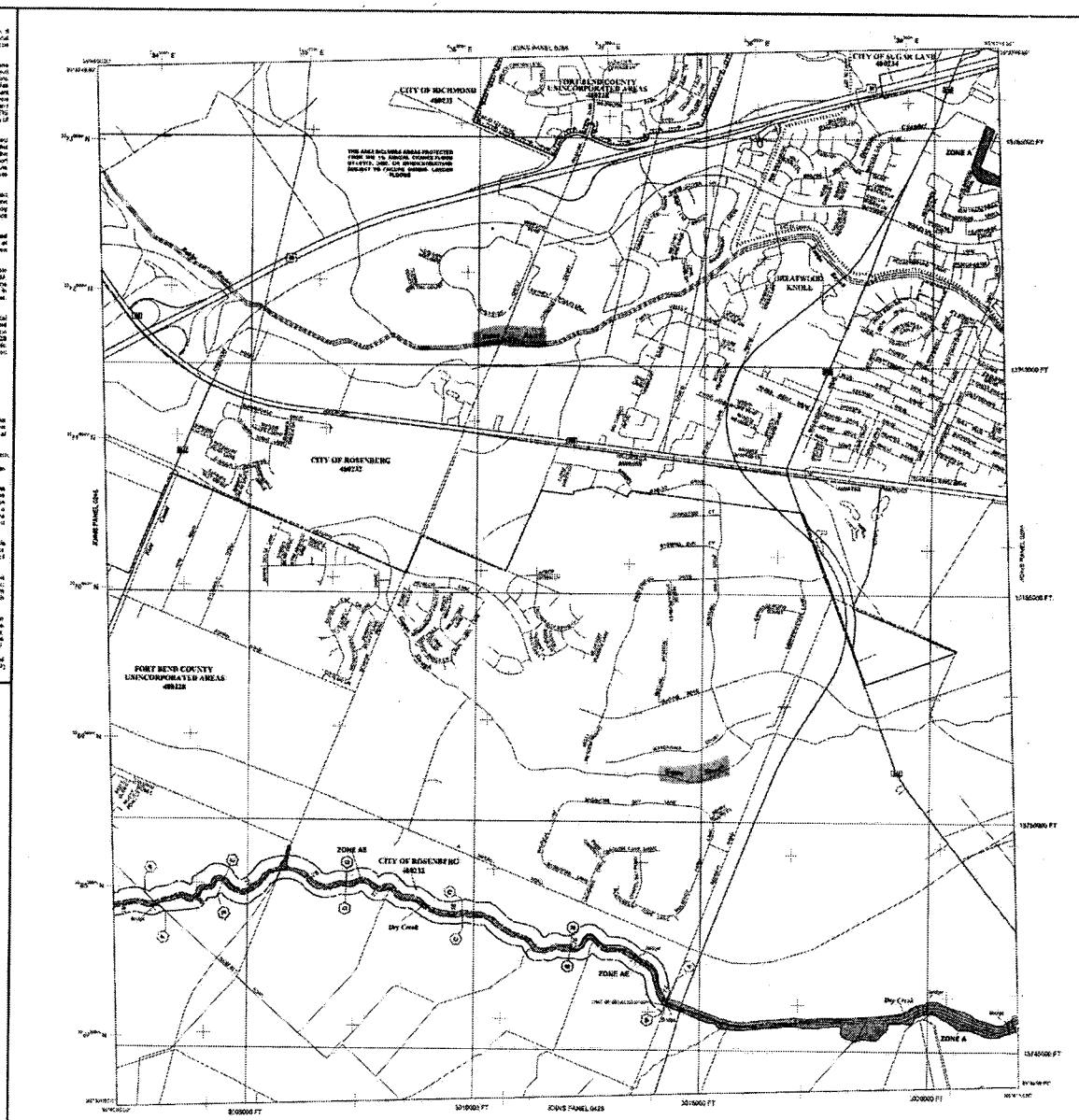
Base map information was obtained from Texas National Resources Information System, Fort Bend County Department of Engineering, Fort Bend County Communities, Coverage Division, and Texas Department of Transportation. Aerial photography was obtained from the U.S. Geological Survey, Houston-Galveston Area Council, and FEMA.

This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodways and floodway boundaries were transferred from the previous FIRM and may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels; community map repository addresses; and a listing of Communities Participating in the National Flood Insurance Program (NFIP) and their effective dates. For the latest product information about National Flood Insurance Program flood maps for each community, as well as a listing of the panels on which each community is located, contact the FEMA Map Service Center at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by FAX at 1-800-358-9620 and its website at http://www.msc.fema.gov.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- B — B — Transect line

97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

1°x1° — Mid-meter Universal Transverse Mercator grid values: 15

4503000mE — Grid ticks

5000000FT — State Plane grid values: Texas (FIPSZONE 4204) Lambert Conformal Conic

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 — River Mile

MAP REPOSITORY
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
150 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0285L

FIRM
FLOOD INSURANCE RATE MAP
FORT BEND COUNTY, TEXAS
AND INCORPORATED AREAS

PANEL 285 OF 575
(SEE MAP INDEX FOR PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FORT BEND COUNTY	480228	0285	L
RICHMOND, CITY OF	480291	0285	L
ROSENBERG, CITY OF	480232	0285	L
SUGAR LAND, CITY OF	480234	0285	L

PRELIMINARY
OCTOBER 30, 2009

MAP NUMBER
48157C0285L
MAP REVISED

Federal Emergency Management Agency



GAPP BAYOU
DRAINAGE BOUNDARY

r.g. miller engineers
since 1966
12121 Wickchester Lane - Suite 200
Houston, Texas 77079
Texas Firm Registration No. F-487



GAPP BAYOU
DRAINAGE BOUNDARY

c.g. miller engineers
Texas Firm Registration No. F-487

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Coastal Base Flood Elevations shown above the Gulf of Mexico are referenced to the North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the floodways were computed at cross-sections and interpolated between cross-sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The projection used in the preparation of this map was Texas State Plane coordinate zone (FIPSZONE 4204). The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional discrepancies in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description and/or location information for bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov.

Base map information was obtained from Texas Natural Resources Information System, Fort Bend County Department of Engineering, Fort Bend County Communities, Utilities and Municipal Districts, and Land Improvement Districts, NOAA National Geodetic Survey, U.S. Geological Survey, Houston-Galveston Area Council, and FEMA.

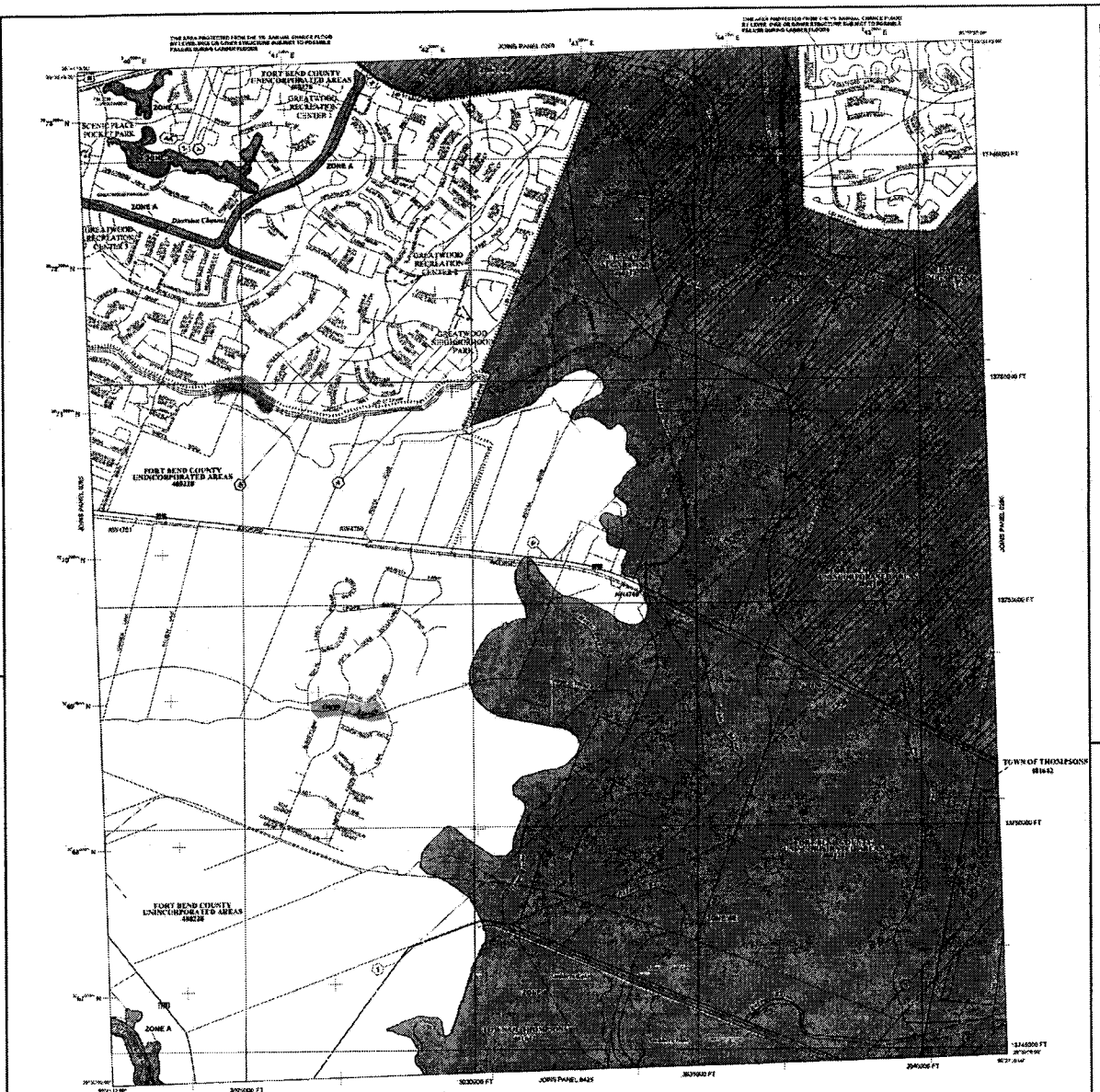
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains that were shown on the previous FIRM were transferred from the previous FIRM base map and re-digitized to reflect new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which reflect channel configurations) may reflect slightly different channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed Map Index for an overview map of the county showing the layout of map panels, community map repository addresses, and a listing of Communities Participating in the National Flood Insurance Program (NFIP) in this jurisdiction. Contact your community's NFIP representative to ascertain whether coverage is available for this community, as well as a listing of the panels on which each community is located.

Contact the FEMA Map Service Center at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov.

If you have questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood

OTHER AREAS

ZONE D — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE B — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

Cross section line

Transect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

1000-meter Universal Transverse Mercator grid values, zone 14

5000-foot grid ticks: Texas State Plane coordinate system, South Central zone (FIPSZONE 4204), Lambert Conformal Conic

Bench mark (see explanation in notes to users section of this FIRM panel)

M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
September 30, 1990
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
0 500 1000 2000 FEET
0 150 300 600 METERS

PANEL 0270L

FIRM
FLOOD INSURANCE RATE MAP
FORT BEND COUNTY, TEXAS AND INCORPORATED AREAS

PANEL 270 OF 575
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FORT BEND COUNTY	480228	0270	L
MISSOURI CITY, CITY OF	480242	0270	L
THOMPSONS, TOWN OF	481642	0270	L

REVISED PRELIMINARY
MARCH 23, 2010

Notice to User: The Map Number shown below should be used when ordering flood insurance. Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
48157C0270L
MAP REVISED

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

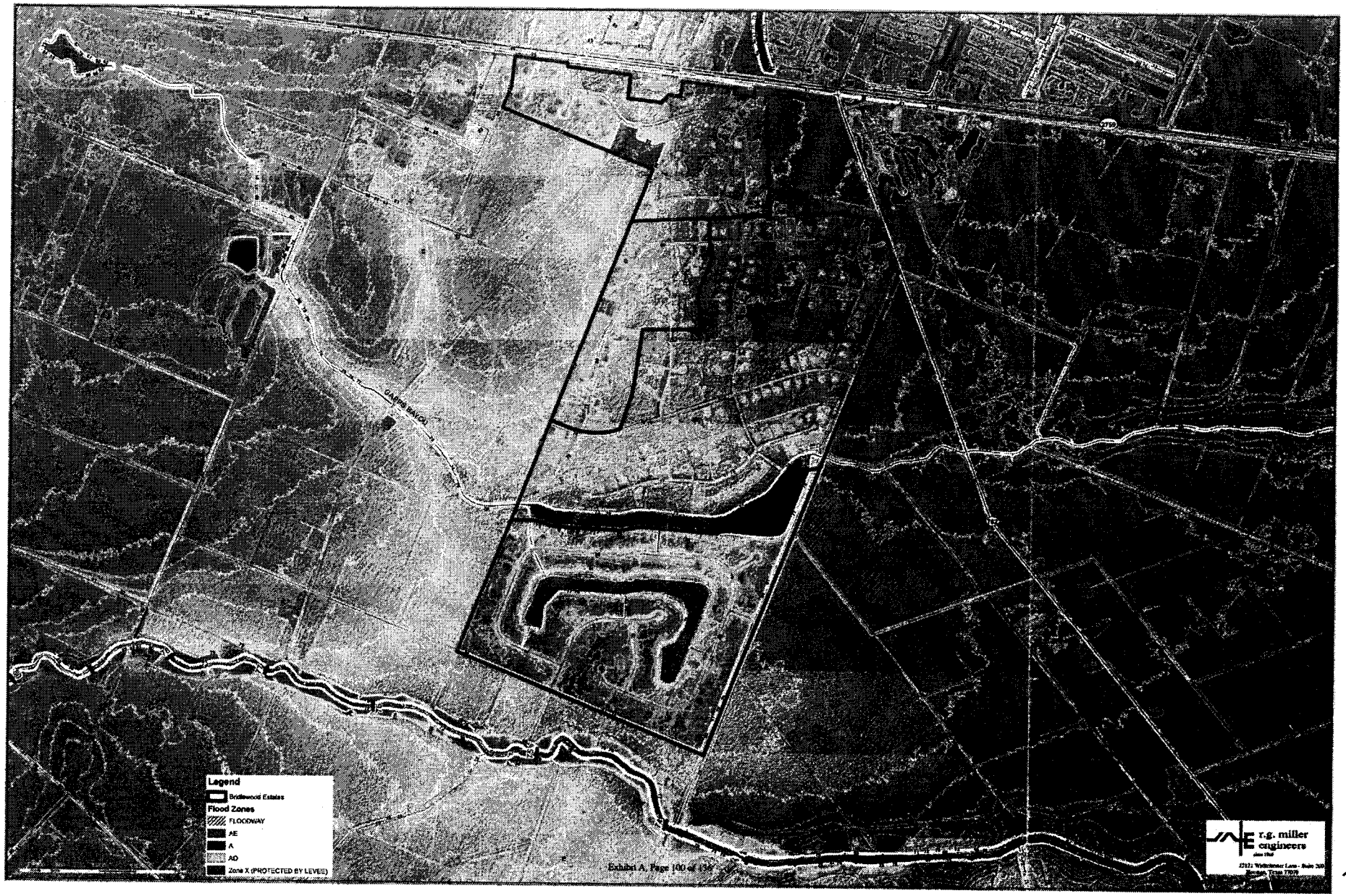


Exhibit A, Page 100 of 134

78.54

ATTACHMENT 11

RESUMES

Resumes for Key Study Personnel

r. g. miller
engineers

DUANE BARRETT, P.E., CFM

Department Manager

Storm Water Management Department email:dbarrett@rgmiller.com

EXPERIENCE

Duane Barrett, P.E. is a native and current resident of Montgomery County, Texas. He is a 1982 graduate of Texas A&M University, where he received a Bachelor of Science degree in Civil Engineering and graduated Summa Cum Laude. Mr. Barrett joined the staff of R.G. Miller Engineers Inc. in November, 2003 to head the firm's Storm Water Management Department, which has subsequently expanded from two staff members to eight and is still growing in terms of both numbers and capabilities. Before coming to R.G. Miller Engineers, Inc., Mr. Barrett was with Dodson & Associates, Inc., serving as Hydrologist, Senior Hydrologist, and Senior Vice-President between 1983 and 2003.

Mr. Barrett has managed a wide range of engineering projects in the fields of hydrology and hydraulics, including flood insurance studies, master drainage studies, channel improvement and hydraulic structure designs, watershed impact analyses, detention facility designs, drainage studies for landfills and industrial facilities, and drainage impact and design studies for transportation projects. He is TxDOT pre-certified in Hydrologic Studies, Basic Hydraulic Design, and Complex Hydraulic Design. Mr. Barrett is a Licensed Professional Engineer and a Certified Floodplain Manager in the State of Texas, and he is a member of the Texas Floodplain Management Association.

PROJECTS

Relevant project experience includes the following.

Parks at Walnut Bend Drainage & Detention Design, Pearland, Texas
This single-family residential development is located west of Veterans Drive and north of Mary's Creek in Pearland, Texas. Mr. Barrett designed on-site detention facilities for gravity drainage to the maximum extent possible, with a storm water pump station provided to empty the lower portions of the two detention basins. He prepared a drainage report for the project and guided the report through the City of Pearland review process, obtaining approval of the drainage/detention plan for the project.

Canterbury Park Development, Pearland, Texas
The Canterbury Park project involved the design of streets, utilities, drainage, and detention facilities for a 170-acre subdivision located on Veterans Drive in Pearland, Texas. Improvements to the channel of Cowart Creek were required in connection with the placement of fill on the property, and a 34-acre amenity lake was designed to provide detention and floodplain mitigation storage for the project. Mr. Barrett led the storm water design team on the project, developed the design recommendations for the amenity lake and Cowart Creek channel improvements, and prepared a drainage report for the project, which was approved by the City of Pearland and Brazoria County Drainage District No. 4.

Regional Detention Facilities for Development in MUD No. 50, Fort Bend County, Texas
This project involved the design of two new regional detention facilities and modifications to an existing detention facility to serve approximately 303 acres of new development in the upper Clodine Ditch (Long Point Slough) watershed. The regional system is designed to provide detention storage for ten (10) individual tracts of land. Mr. Barrett served as senior project manager on this study, supervising the modeling and design work completed in connection with the project, as well as report preparation.

Canyon Gate at the Brazos and Lakes of Williams Ranch Developments, Fort Bend County, Texas
These adjacent developments are located immediately north of Rabbs Bayou, south of U.S. Highway 59, and a short distance west of Crabb River Road. Drainage requirements associated with these developments included two on-site detention/amenity lakes, a large sub-regional detention facility, and a new bypass channel that will drain the upper Middle Bayou watershed to Rabbs Bayou. Coordination

with the Texas Department of Transportation and the Fort Bend County Drainage District was required in order to ensure that all regulatory requirements were satisfied. Mr. Barrett served as the project manager and principal design engineer for storm water drainage facilities on both properties.

Lost Creek Subdivision, Fort Bend County, Texas
The Lost Creek subdivision is located south of FM 1093 and east of Peek Road. Storm water drainage facilities for Lost Creek included a series of four (4) interconnected detention basins that drain to Clodine Ditch. The design of this system required careful balancing of storm water inflows and outflows in order to ensure that the system will function effectively during severe storm events. Mr. Barrett served as the project manager and principal design engineer for the storm water detention facilities on the Lost Creek property.

Regional Detention Basins for Greens Bayou, Harris County, Texas
This project involved the design of two interrelated regional storm water detention facilities in northeastern Harris County, Texas. This very complex project involved watershed hydrology and hydraulics, construction phasing and scheduling, and the design of a unique "wetlands bank" to add environmental value to the project. Mr. Barrett served as the project manager and principal design engineer for this study and personally prepared modeling and design data for one of the two detention facilities.

Bellaire Boulevard at State Highway 99, Fort Bend County, Texas.
R.G. Miller Engineers, Inc. responded to frequent flooding at the intersection of Bellaire Boulevard and State Highway 99 by designing a new outlet from the Bellaire Boulevard storm sewer system to the channel of Long Point Slough. Completed an analysis of potential impacts associated with the construction of the new outlet and determined that no adverse impacts would occur. Developed construction documents and cost estimates for the new outlet, which was constructed at a cost savings of 95% as compared with an earlier alternative for alleviating the flooding problem. Reference: Sam Talje, P.E., Texas Department of Transportation

Grant Road and Kitzman Road Drainage and Wetland Mitigation Project, Harris County, Texas.
This project involved the design of improvements needed to restore storm drainage interrupted by prior fill activities with special provisions to allow wetland mitigation facilities to be established on two separate properties. Provided oversight and administrative support during the construction of the drainage improvements and mitigation facilities, coordinating with the contractor, environmental experts from Crouch Environmental Services, Inc., and the Harris County Public Infrastructure Department. Reference: Teresa Beavers, P.E., Harris County Public Infrastructure Department

Construction Plans for Regional Detention Basin E500-03-00, Harris County, Texas.
This project involved the preparation of construction documents associated with the expansion of this regional detention facility to a volume of nearly 1,000 acre-feet. Basin E500-03-00 is roughly rectangular in shape and is split into two portions by an existing pipeline easement. A wet bottom is provided on both sides of that easement. The detention basin configuration developed by RGME provides wide, gently-sloping shelves around the two ponds and varying water depths within the ponds so that new wetlands may be established within the basin. When the basin is completed, a total of 7.0 acres of new wetlands areas will be created, and the area of open water within the basin footprint will be 32.3 acres. An existing cultural site located in the northeastern portion of the site will be left undisturbed. RGME prepared the necessary construction documents, coordinated field survey and other activities related to the project, and developed construction cost estimates. The construction cost associated with the project is $4,558,000. Reference: Kirk Hooper, Harris County Flood Control District, 713/684-4050.

DUANE BARRETT, P.E., CFM
Department Manager
Storm Water Management Department email:dbarrett@rgmiller.com

Northeast Oyster Creek Master Drainage Plan, Fort Bend County, Texas
This project involved the development of an overall master drainage plan for a small watershed in Missouri City, Texas with a number of special problems regarding outfall capacity. The final plan incorporated channel improvements, regional detention, and environmental features in a drainage system capable of accommodating runoff from a 1% annual chance, 24-hour storm event. Mr. Barrett served as the project manager and principal investigator in the development of the plan.

Lakeshore Harbour Development, Fort Bend County, Texas
The Lakeshore Harbour project involved the development of 260 acres of land located immediately adjacent to Kitty Hollow Lake in Missouri City, Texas. This project called for an extensive amenity/detention lake system with numerous "fingers" alternating with strips of residential development. Mr. Barrett served as the project manager and principal designer for the Lakeshore Harbour drainage study.

FIS Update Studies & Master Drainage Plans for the City of Lufkin, Texas
This project called for the development of complete hydrologic and hydraulic models for several major watersheds, the identification of existing flooding problems, and the development of recommendations regarding cost-effective interim and long-term solutions. Digital data files developed using aerial photogrammetry were used for flood plain mapping and preliminary designs of interim and long-term flood protection improvements. Study results were submitted to FEMA. As project manager for this study, Mr. Barrett headed the team that developed modeling data and flood plain maps, designed regional detention facilities, and prepared project reports. He prepared successful applications for grants from the Texas Water Development Board and co-authored a Drainage Criteria Manual for the City.

Drainage Criteria Manual, Montgomery County, Texas
This project involved the development of a complete manual detailing hydrologic and hydraulic design and analysis standards for this rapidly-growing portion of the Houston area. In developing the manual, drainage regulations and manuals from over 70 urban areas across the United States were analyzed. Accurate and flexible methods of computing peak flow rates and runoff hydrographs throughout the county were developed and detailed in the manual. Mr. Barrett co-authored the criteria manual and personally completed much of the background research.

Brays Bayou Re-Study, Harris County, Texas
The results of this study included updated hydrologic and hydraulic modeling data for the watershed, as well as updated digital flood plain mapping data. All hydraulic modeling and mapping products were based on LIDAR topographic data. In addition to providing final modeling and mapping data for the watershed, the study established methods, procedures, and criteria used in the Tropical Storm Allison Recovery Project. The project also included an analysis of the effects of subsidence on flooding depths in the Brays Bayou watershed. As project manager for the Brays Bayou project, Mr. Barrett headed the team responsible for developing modeling data, flood plain data, maps, and other work products.

Dickinson Bayou Update Study, Galveston County, Texas
This project, which was 50% funded by the Texas Water Development Board, involved the development of hydrologic and hydraulic models for a major watershed with a total drainage area of about 106 square miles. The project identified existing flooding problems and recommended cost-effective interim solutions. In addition, a complete analysis of ultimate development was prepared, with recommended designs for future drainage improvements. Possible sources of funding were identified, and a detailed implementation plan was prepared for both interim and long-term improvements. Mr. Barrett managed all hydrology and hydraulics tasks on the Dickinson Bayou project and headed the master drainage planning effort.

Big Creek Hydraulic Study, Fort Bend County, Texas
This hydraulic study was completed to identify the most efficient use of a fund containing approximately nine million dollars ($9,000.000) for the purpose of constructing improvements to the channel of Big Creek. Work done to accomplish this included the development of hydrologic and hydraulic models, preparation of alternative channel improvement plans, assessments of the effects of these alternatives on flooding potential, and the preparation of preliminary cost estimates. As project manager for the Big Creek study, Mr. Barrett was responsible for the development of all modeling data, channel improvement plans, and cost estimates. He coordinated sub-contract work involving field survey, environmental services, and computer aided drafting.

Jersey Village Channel Improvement Project, Harris County, Texas
The Jersey Village Channel Improvement Project involves modifications to Harris County Flood Control District Channels E141-00-00 and E200-00-00 upstream of Regional Detention Basin E500-10-00. The total length of improved channel is approximately 11,400 feet, and the total proposed excavation volume associated with the proposed project is approximately 305,200 cubic yards. The proposed improvements to Channels E141-00-00 and E200-00-00 will increase flood flow conveyance capacity in the area and help to reduce flooding along White Oak Bayou by taking some of the flow from that stream. Provided direct oversight and management of personnel involved in preparation of construction documents and cost estimates for the channel improvement project. Evaluated alternatives for addressing problems with wet sands and supervised the development of hydraulic models needed to evaluate erosion potential. Coordinated design efforts with the Harris County Flood Control District.

Drainage Design Studies for Development in LID No. 12, Fort Bend County, Texas
This series of projects involved the design of detention facilities and associated drainage improvements to serve multiple developments in the upper Clodine Ditch (Long Point Slough) watershed. The projects studied include Parkway Lakes, Lost Creek, and Shops at Bella Terra, as well as 300 acres of future development along Peek Road. Responsible for the completion of drainage impact and mitigation studies for each project. Analyzed existing drainage systems, designed required drainage improvements, and developed recommendations for mitigation of impacts. Also prepared recommendations for improvements to an existing detention facility maintained by Fort Bend County MUD No. 50.

Regional Detention Basin E535-01-00, Harris County, Texas
R. G. Miller Engineers, Inc. was selected by the Harris County Flood Control District to complete a project development study for this 42-acre regional detention site and establish preliminary design information, incorporating input from the HCFCD and the City of Jersey Village. Major components of the project are being sized and laid out, including a basin grading plan, storm water diversion and release structures, water quality features, and park facilities. RGME is also working to establish a route for an existing street to be extended across the southern portion of the site. Mr. Barrett serves as the project manager.

Denman Road Impact Analysis & Cross-Drainage Design Study, Lufkin, Texas
This project involved an investigation into a proposed upgrade to existing cross-drainage culverts under Denman Road. Modified existing conditions hydrologic and hydraulic modeling data to reflect the proposed upgrade and assessed the potential for impacts. Developed a project report for submission to the City of Lufkin. Provided direct oversight and management for all drainage investigations, modeling, and computations, and provided coordination with the City of Lufkin.

IH 35, Waco District
4.88 mile frontage road reconstruction/expansion of the two way 2-lane frontage roads to a one way 4-lane facility with storm sewer design, culvert extensions and SW3P. Responsible for hydrologic analyses associated with longitudinal storm sewers and a group of non-bridge class culverts crossing IH 35

between FM 1304 and FM 310, in Hill County, Texas. Defined drainage boundaries and computed peak runoff rates for a wide range of storm frequencies. Coordinated with engineers in the Transportation Group at R.G. Miller Engineers, Inc. in the completion of hydraulic analyses of the appropriate culverts and storm sewer systems

Beltway 8 Roadway Expansion Impact Analysis, Harris County, Texas

This project involved enclosing portions of channels P107-00-00 and P107-04-01 in large box culvert storm sewer systems, introducing a bridge-class culvert along channel P107-04-00, channel realignment, installing a notched weir flow control structure in channel P107-00-00, and providing detention storage. Responsibilities included development of hydrologic and hydraulic modeling data, as well as the development of design recommendations for the box culvert storm sewer system, bridge-class culvert, and flow control structure, as well as required detention facilities along the roadway alignment.

Spring Stuebner Road, Harris County, Texas

This project involved extensive hydrologic and hydraulic analyses of the Spring Cypress Watershed using HEC-HMS and HEC-RAS computer software. Responsible for the completion of drainage impact and mitigation studies for three project segments of Spring Stuebner Road totaling approximately five miles of roadway. Used HEC-HMS and HEC-RAS software to analyze existing drainage systems, design required drainage improvements, and develop recommendations for mitigation of impacts. Major drainage features designed in connection with the project included roadway outfall, channel improvements, and storm water detention facilities. Prepared drainage reports to summarize the study results for each roadway segment.

Bay Area Boulevard / Sens Road, Harris County, Texas

This project involved the extension of Bay Area Boulevard from Fairmont Parkway to Spencer Road in the southeastern portion of Harris County, Texas. Drainage features associated with the project included an outfall channel that doubled as an in-line detention facility, plus improvements to existing channel A104-07-00 and a detention /mitigation facility required to mitigate impacts associated with flood plain storage losses. Responsible for the development of hydrologic and hydraulic modeling data and the development of a plan for providing adequate outfall drainage for Bay Area Boulevard while mitigating potential impacts on downstream peak flow rates. Prepared a report on the results of the analysis and coordinated with the Harris County Public Infrastructure Department, along with design engineers retained by the HCPID to prepare construction documents for the required drainage improvements.

ADDITIONAL PROJECT EXPERIENCE

- Detention Design Analysis for the Parkway Lakes Development, Fort Bend County, Texas
- Shops at Parkway Lakes Detention System, Fort Bend County, Texas
- Cooling Water Discharge System, Maraven Refinery, Cardon, Venezuela
- Northgate Crossing Levee & Development, Harris County, Texas
- Villages of Cypress Lakes Sub-Regional Detention, Harris County, Texas
- Drainage Analysis for Super Target Store, Humble, Texas
- Augusta Pines Drainage & Detention, Harris County, Texas
- Canterbury Park Development, Pearland, Texas
- Master Drainage Plan for the NorthPointe Development, Harris County, Texas

DUANE BARRETT, P.E., CFM
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- Apartment Project on Buffalo Bayou, Houston, Texas
- Development of Small Site Detention Criteria, Galveston County, Texas
- Memorial Villages Water System Analysis, Memorial Villages Water Authority
- Dallas Floodway Extension Project, U.S. Army Corps of Engineers Fort Worth District
- Detention Design, Montgomery High School, Montgomery, Texas
- Drainage Improvement Analysis, TDCJ Gatesville Facility, Gatesville, Texas
- Detention Analysis for Klein Collins High School, Harris County, Texas
- Sawdust Road Scour Analysis, Montgomery County, Texas
- Sunrise Lakes Channel Improvements & Sub-Regional Detention, Pearland, Texas
- Impact Analysis & Detention Design Study for Mills Pointe, Fort Bend County, Texas
- Pine Trace Detention/Floodway Corridor, Harris County, Texas

EDUCATION

Bachelor of Science, Civil Engineering, Texas A&M University, 1982
Five-Day HEC-5 Training Seminar, Davis, California
Three-Day Flood Plain Management Training, Houston, Texas 2004

PROFESSIONAL REGISTRATIONS

Licensed Professional Engineer – State of Texas No. 63703, 1988
Texas Floodplain Manager – State of Texas No. 0603-04N

TECHNICAL PUBLICATIONS

- "What Do We Do with the Big Ones?" *Civil Engineering News*
- "Shedding Tears Over Regulations Just Adds to Flooding Problems" *Houston Business Journal*

TXDOT PRE-CERTIFICATION NO. 000006575

Hydrologic Studies
Basic Hydraulic Design
Complex Hydraulic Design

AFFILIATIONS

Texas Floodplain Managers Association
Chi Epsilon
Huntsville – Walker County Chamber of Commerce
Greater Conroe / Lake Conroe Area Chamber of Commerce

FRED BAUHOF, P.E.

Executive Vice President of Public Works email:fbauhof@rgmiller.com

SPECIALIZED DESIGN EXPERIENCE

Mr. Bauhof has extensive experience managing complex civil and environmental engineering projects such as water conveyance systems, water and wastewater treatment plants, wastewater collection systems, dams, energy conservation studies, roads, highways, railroads, environmental remediation, airport and marine facilities. He has been responsible for strategic/conceptual planning, environmental studies, feasibility studies, engineering analyses and design, cost estimates, contract documents, bidding phase services, construction management, claims management, resident engineering and emergency response.

SPECIFIC PROJECT EXPERIENCE

Project: **Coastal Water Authority (CWA).** The CWA provides untreated surface water to the cities of Houston, Baytown, and Deer Park for municipal purposes with a series of pump stations, canals, and high pressure, large diameter pipelines.
Role: Principal in Charge for the General Engineering Consultant (GEC)
Contribution: Oversaw the development of work plans and the execution of maintenance and capital improvement projects, such as water line extensions, pump station expansions, chemical addition systems, and condition assessments following hurricane events

Project: **Houston Area Water Corporation (HAWC)** Northeast Water Purification Plant (NEWPP). The NEWPP is an 80 mgd conventional water treatment plant located on Lake Houston that was developed through a design/build/operate contract approach. The project also includes a raw water intake structure and pump station, high service pump station, 10-MG ground storage tank, and over 50,000 feet of 84-inch and 42-inch diameter steel and ductile iron water transmission pipelines.
Role: Project Manager for the General Engineering Consultant
Contribution: Management of the GEC team during the procurement, development and construction phases of the NEWPP.

Project: **East Water Purification Plant Capacity Expansion and Switchgear Replacement (City of Houston).** Project included construction management services for treatment process and hydraulic improvements to increase plant capacity from 320 to 350 mgd. The switchgear replacement construction project includes electrical upgrades and switchgear replacement.
Role: Project Manager
Contribution: Management of the construction management team including resident observation, contract administration, and coordination with the plant operations, contractor, and design engineer.

Project: **Northborough WWTP (City of Houston).** This project involved the abandonment of a small aging wastewater treatment plant that is expensive to maintain and requires costly upgrades. The plant will be decommissioned and the flows conveyed to the nearby Northgate WWTP through a 5-mile long 12-inch-diameter force main. Engineering services include preliminary engineering, final design, and engineering services during construction.
Role: Project Manager
Contribution: Management of the project team during the final design phase.

Project: **Phase I Preliminary Energy Conservation Evaluations for Water and Wastewater Facilities (City of Houston and Reliant Energy).** Eight facilities were evaluated including the 69th Street WWTP sludge dryers, cryogenic oxygen plant, and treatment process; Clinton Driver Lift Station; Southwest and Imperial Valley WWTP treatment processes; Heights Pump Station; and water supply wells. Wastewater facilities projects with favorable economic paybacks included the 69th Street WWTP mixing optimization, Clinton Dr Lift Station pumping modifications, and Imperial Valley WWTP Aeration Optimization.

FRED BAUHOF, P.E.
Executive Vice President of Public Works email:fbauhof@rgmiller.com

Role: Project Manager
Contribution: Management of the project team during the preliminary evaluation phase.

Project: **Collaborative Strategic Plan for Regional Water Distribution System (City of Houston).** The project's goal was the development of a Regional Groundwater Reduction Plan for Area 3 of the Harris-Galveston Coastal Subsidence District to achieve the least cost regulatory compliance for the conversion from groundwater to surface water. The project required regional planning for water treatment plants, and water transmission and distribution systems; financial rate studies; stakeholder outreach programs; and water supply agreement development.
Role: Assistant Project Manager
Contribution: Management of the team during the study phase.

EDUCATIONAL BACKGROUND

- Bachelor of Science, Geology, University of Florida, 1976
- Master of Engineering, Geological Engineering, University of Missouri, 1979

PROFESSIONAL REGISTRATIONS

- Licensed Professional Engineer – State of Texas No. 86515, 2000 (Expiration Date 12/31/10)

JUNG JANG, P.E., CFM

Project Engineer

Storm Water Management Department email:jjang@rgmiller.com

EXPERIENCE

Jung P. Jang, P.E. is a 2001 graduate of Texas A&M University, where he received a Bachelor of Science degree in Civil Engineering. Mr. Jang joined the staff of R.G. Miller Engineers, Inc. in December, 2005 as an Associate Engineer in the Storm Water Management Department. Before coming to R. G. Miller Engineers, Inc., Mr. Jang was with Lockwood, Andrews & Newnam, Inc. for 5 months and Jones and Carter, Inc. for 4 years.

Mr. Jang has wide range of experience in the fields of hydrology and hydraulic engineering. Mr. Jang's experience includes preparation of drainage analyses, floodplain mitigation, drainage facilities design, and development of storm water quality management plans. Mr. Jang has dealt with many floodplain issues, including the preparation of LOMA, LOMR-F, and LOMR submittals, as well as coordination with FEMA and its technical consultant during the submittal review process.

PROJECTS

Relevant project experience includes the following.

Silvercreek Drainage Study and Detention Basin, Brazoria County
The Silvercreek development is located in the northeastern part of Brazoria County, Texas and within the City of Manvel ETJ. The Silvercreek development is a part of the Silverlake Drainage System, which drains to Mary's Creek. The tasks completed in connection with this project include an evaluation of the hydraulic and hydrologic impacts on the existing Silverlake Drainage System and Mary's Creek, a recommendation of the size of a detention basin needed to mitigate increased runoff due to the Silvercreek development, and the design of the Silvercreek detention basin, which also included construction phasing of the basin.

Spring Stuebner Road Segment "B" Drainage Analysis, Harris County, Texas
Approximately 7,000 feet long Segment "B" of Spring Stuebner Road is located in northern Harris County between Kuykendahl Road and Interstate Highway 45. This project involved extensive hydrologic and hydraulic analyses of the Spring Cypress Watershed using HEC-HMS and HEC-RAS computer software. The drainage analysis recommended utilizing the adjacent development's proposed channel improvements (Channel J121-01-00) and detention basin for its detention and conveyance requirements, which was significant cost saving drainage solution for the client.

Chelsea Harbour Subdivision Lake Monitoring, Fort Bend County, Texas
This project involved an extensive monitoring analysis of the Chelsea Harbour amenity lake system. This analysis was completed for the specific purpose of quantifying the average rate of seepage from the lake system. Data collected (including wind speed, wind direction, rainfall, water surface elevations, pump reading, and temperature) over a 22-month effort to monitor the lake system were analyzed and interpreted.

Willow Lake Drainage Analysis, Harris County, Texas
The Willow Lake subdivision is located east of Stuebner-Airline Road, north of F.M. 2920, and west of Dowdell Road in northern Harris County, Texas. Work completed on this typical development project included a drainage study, flood plain mitigation analysis, detention requirements, and the hydraulic impact assessment. An existing 8.5-acre lake within the tract was utilized for flood plain mitigation and

the detention storage volume. A separate additional basin was added to supplement the available volume in the existing lake.

Morton Road Drainage Analysis, Harris County, Texas
This project involved extensive hydrologic and hydraulic analysis of Morton Road Creek (Ditch U101-07-00) in western Harris County, Texas. The drainage area of the U101-07-00 watershed was revised to reflect current drainage patterns based on LiDAR topographic contour data, aerial photographs, and site visits. A lateral weir analysis of the existing Morton Road was incorporated into a HEC-RAS computer model of U101-07-00 using the latest topographic survey information along the roadway as well as new flow rates. This resulted in more reliable overflow data for U101-07-00 and identified the location and extent of the current overflow area. The impact of this new overflow data on the T101-00-00 (Mason Creek) watershed was analyzed as a part of the overall drainage analysis.

Morton Creek Ranch, Harris County, Texas
The 527-acre Morton Creek Ranch development is located in the western portion of Harris County, Texas, and proposed to be developed as a single-family residential subdivision. The development required a complex drainage solution including hydraulic analyses of Channels U101-07-00, U101-00-00, and U101-08-00, a detailed hydrologic analysis of the watershed, and the submission of a LOMR request to FEMA.

Eagle Creek Subdivision, Harris County, Texas
The proposed Eagle Creek development is located at the southwest corner of the Beltway 8 crossing of Garners Bayou (P130-00-00). Conveyance, detention, and floodplain storage mitigation analyses were completed to update prior drainage studies completed in connection with this project. The current condition of the Eagle Creek property was updated, and an updated mitigation plan for the remaining development was prepared.

T501-01-00 Regional Detention Study, Harris County, Texas
Regional Detention Basin T501-01-00 is located south of Morton Road and at the very upstream end of Mason Creek (T101-00-00). This project involved a re-study of the T101-00-00 (Mason Creek) drainage area (the detention service area) to consider overflow patterns north of Morton Road, define the service area of the basin, and develop an ultimate plan for providing storage in the basin. In completing the required analyses, existing water quality features, including plants and restrictor structures, numerous trees and trails, and other measures, that are to be preserved. A Project Development Report will be prepared at the conclusion of this ongoing project.

Greenbriar and Glen Shannon Subdivision, Galveston County
This project involved an analysis of the Glen Shannon subdivision's storm sewer system and the roadside ditch drainage system of Greenbriar Road in the City of Friendswood, Texas. The existing storm sewer system, including inlets, storm sewers, and the receiving drainage ditches, were analyzed, and recommendations to upgrade the storm sewer system to satisfy current City of Friendswood drainage criteria were provided.

Harris County Flood District's Channel Restoration Project, Harris County
This project involved designing and producing construction plans for a proposed A104-10-02 channel enclosure and A107-03-00 and A107-03-02 channel restoration project for Harris County Flood Control District's Maintenance Group. The existing channel conditions were evaluated, and recommendations to restore the channels and to prevent further failures on the channels were provided in the construction

drawings, which identified each failed section of the channel and provided engineering solutions to restore the failed sections.

Master Drainage Plan Study for Vicksburg Ditch, Fort Bend County
The Vicksburg Ditch is located in the northeastern part of Fort Bend County, Texas and drains to Kitty Hollow Lake. The purpose of the Vicksburg Ditch drainage report was to evaluate and set the ultimate requirements for the Vicksburg Ditch System. The tasks completed in connection with the study included an evaluation of the hydrologic and hydraulic requirements for the ultimate Vicksburg Ditch System, the required ultimate channel sizing to serve 914 acres draining through the Vicksburg Ditch System, an evaluation of interim channel requirements for the development of the Olympia Estates subdivision, an evaluation of the hydrologic impact of the Olympia Estates development on the Kitty Hollow Lake weir, determination of the ultimate weir sizing, preparation of construction plans for grout injection to stabilize the levee at Kitty Hollow Lake, and an evaluation of the existing drainage situation throughout Kitty Hollow Park, in particular the existing park road to Kitty Hollow Lake. The tasks also include the design and preparation of construction plans for the bottom of Vicksburg Channel to meet the storm water quality requirements as defined by the environmental consultant, which included a meandering pilot channel with overbays.

Silvercreek Drainage Study and Detention Basin, Brazoria County
The Silvercreek development is located in the northeastern part of Brazoria County, Texas and within the City of Manvel ETJ. The Silvercreek development is a part of the Silverlake Drainage System, which drains to Mary's Creek. The tasks completed in connection with this project include an evaluation of the hydraulic and hydrologic impacts on the existing Silverlake Drainage System and Mary's Creek, a recommendation of the size of a detention basin needed to mitigate increased runoff due to the Silvercreek development, and the design of the Silvercreek detention basin, which also included construction phasing of the basin.

Mustang Bayou Diversion Channel Analysis, Fort Bent County
The Mustang Bayou Diversion Channel, which is located in northeastern Fort Bend County, was constructed to divert flows from Mustang Bayou in an effort to relieve flooding in the lower reaches of the Mustang Bayou w atershed. After reviewing the existing Mustang Bayou Diversion Channel Master Drainage Study, the existing condition of the watershed was re-established by creating a baseline condition to reflect current conditions. The ultimate watershed conditions for Mustang Bayou and Mustang Bayou Diversion Channel were defined, and the ultimate flow and right-of-way of Mustang Bayou Diversion Channel were determined. Although the Mustang Bayou Diversion Channel was constructed in the 1970's, a LOMR was never submitted to FEMA; therefore, the floodplain and floodway for Mustang Bayou were incorrectly mapped, and the base flood elevation (BFE) for Mustang Bayou Diversion Channel was never established. For an effort to delineate the floodplain and floodway with the Mustang Bayou Diversion Channel in place, the Letter of Map Revision (LOMR) for Mustang Bayou and Mustang Bayou Diversion Channel was prepared based on the existing condition defined in the study.

Park Lakes Floodplain Mitigation and Dry Detention Pond, Harris County
The 589-acre Park Lakes development is located in the northeastern portion of Harris County, Texas and is proposed to be developed as a single-family residential subdivision with some commercial tracts and a wet-bottom detention/amenity basin. Approximately 94 acres of the Park Lakes development lies within the 100-year floodplain Zone AE. The tasks completed in connection with this project include calculation of the floodplain storage volume loss, design of a compensating floodplain excavation basin to mitigate fill within the floodplain, prep aration of construction plans for the offsite fill mitigation facilit y, hydraulic analysis of the fill and cut, and design of a Park Lakes dry detention pond including a control weir structure with a culvert and the outfall pipe.

JUNG JANG, P.E., CFM
Project Engineer
Storm Water Management Department email:jjang@rgmiller.com

Pine Forest Green Detention Basin, Harris County
This project involved design and construction plan preparation of the detention basin for a residential development. A phasing plan for the construction was prepared, and an alternate plan to detention basin was developed. Advertised, received and reviewed bids from contractors.

Lone Oak Outfall Channel and Detention Basin Design, Harris County
This project involved designing of the outfall channel and detention basin for 117-Acre Lone Oak Development within Harris County Municipal Utility District No. 173 according to the guideline specified in Harris County Flood Control District's Criteria Manual. Construction plans, contract documents, and technical specifications were prepared for this project. The tasks for this project also included advertising, receiving, and reviewing bids from contractors. Contractor monthly pay estimates were reviewed, and construction issues were addressed during the life of the construction phase.

Springbrook Detention Basin, Harris County
The tasks completed in connection with this project include preparation of construction plan of the detention basin and storm water quality features for a residential development. Also included in the project is a preparation of a phasing plan for the construction. Advertised, received and reviewed bids from contractors. Reviewed the contractor's monthly pay estimates, made periodic site inspections, and addressed the construction issues.

ADDITIONAL PROJECT EXPERIENCE

- Channelview Comfort Suite Drainage Analysis, Harris County, Texas
- Morton Road Bridge CLOMR, Harris County, Texas
- Senger Creek Drainage Analysis, Harris County, Texas
- 311-Acre Tract Drainage Analysis, Fort Bend County, Texas
- Amendment to League City Drainage Analysis and a LOMR , Galveston County, Texas
- Jack Powell Ford CLOMR, City of Mineral Wells, Texas
- Alabama and Nelson Road Flap Gates Design, City of Wharton, Texas
- Firethorne LOMR/CLOMR, Harris County, Texas
- Gosling Road Drainage Analysis, Harris County, Texas
- Sprint Tract Landfill Site Hydrologic Impact Analysis, Harris County, Texas

EDUCATION

Bachelor of Science, Civil Engineering, Texas A&M University, 2001

PROFESSIONAL REGISTRATIONS

Licensed Professional Engineer – Texas No. 101118
Texas Floodplain Manager – State of Texas No. 1980-10N

ADAM RODRIGUEZ, P.E., CFM

Engineering Associate

Storm Water Management Department email:arodriguez@rgmiller.com

EXPERIENCE

Adam Rodriguez, P.E. has over 6 years of experience in storm water management. He has managed a wide range of engineering projects in the fields of hydrology and hydraulics, including flood insurance studies, master drainage studies, channel improvement and hydraulic structure designs, watershed impact analyses, detention facility designs, drainage studies for landfills and industrial facilities, and drainage impact and design studies for transportation projects.

PROJECTS

Kennedy Greens Drainage Study, Harris County, Texas
This project involved the development of a 215-acre property within the regulatory floodplain and floodway. A drainage study was performed to determine the location of fill to remove a portion of the site from the floodplain without impact to regulatory flood profiles. The project resulted in modified hydrologic and hydraulic modeling data to reflect the on-site fill, channel overbank improvements, detention basin, and mitigation basins. Developed a project report for submission to the Harris County and a CLOMR for submission to FEMA. Performed hydrologic and hydraulic modeling for existing and proposed conditions. Determined possible locations for on-site fill. Recommended mitigation and detention pond location and configuration to achieve no-impact results. Drafted reports for submission to Harris County and FEMA, and secured CLOMR.

Garden District Drainage Analysis and Design, Lufkin, Texas
The Garden District Drainage analysis involved the realignment of a natural channel that bisected the site. The channel was realigned to the back side of the site and passed through two existing detention ponds and a small hill to connect to two drainage culverts downstream of the site. Detention for development of the site was also provided. Performed existing and proposed conditions hydrologic analyses of the watershed. Assisted with the design of the proposed detention pond and realignment channels. Performed hydraulic analysis of proposed channel improvements and existing drainage structures. Designed energy dissipating structures to control channel velocities. Coordinated design with City of Lufkin drainage criteria and submitted drainage report.

Academy Street Drainage Improvement Project, Houston, Texas
This project involved the design of improvements to the Academy Street drainage system as well as roadway and utility upgrades in part to alleviate street flooding the area. The effects of the project on an adjacent drainage ditch. Detention was also specified to eliminate impacts from the drainage improvements. Verified Houstorm analysis of drainage system. Created existing and proposed conditions hydrologic models of the drainage area. Determined minimum required detention volume to eliminate adverse impacts to Brays Bayou. Determined storm sewer capacity and street flooding depth during peak storm events.

Oak Bend Medical Center, Fort Bend County, Texas
This project involved diverting flow around a proposed hospital site in Fort Bend County. The 16.6-acre hospital site was bisected by a small channel cutting through the middle of the site that conveyed runoff from US 59 into Middle Bayou. Developed a drainage plan to divert the US 59 runoff as well as site runoff into an improved roadside ditch and convey the flows around the site. The roadside ditch was redesigned to flow in the opposite direction and eventually connect back to Middle Bayou while also containing design storm flood levels within channel banks. Created existing and proposed conditions hydrologic models to estimate flows in the ditches. Performed hydraulic analysis of proposed drainage system to ensure flows were contained within channel banks and no adverse impacts were created.

ADAM RODRIGUEZ, P.E., CFM

Engineering Associate
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Washam Road Drainage Study, Houston, Texas
This project involved the investigation of persistent flooding problems along Washam Road in the City of Houston. The limits of the roadway watershed and corresponding peak flow rates were determined. The capacity of existing culverts and roadside ditches were evaluated and recommendations were made for drainage improvements to alleviate flooding in the area. Created hydrologic model of the roadway watershed and determined peak 2-year flow rates. Evaluated each roadway culvert to determine capacity and effectiveness. Recommended which culverts should be replaced and the required size to convey 2-year flows.

South Braeswood Road Improvement Project, Houston, Texas
This project involved utility and roadway improvements to the developed area that drains to South Braeswood between Stella Link and Kirby Drive. In addition to improvements to the roadways, water, and sanitary lines, much of the storm sewer pipes were replaced and rerouted. The project directly affected 10 total outfalls that discharge directly to Brays Bayou. The total drainage area consisted of 1430 acres of residential and commercial developments. Performed hydrologic analysis of 10 outfalls into Brays Bayou for 2-year and 10-year storm events for existing and proposed conditions. Quantified impacts to peak outflow rates.

EDUCATION

- Bachelor of Science, Civil Engineering, Texas A&M University, 2004
- Four-Day Floodplain Management Training, Beaumont, Texas 2009

PROFESSIONAL REGISTRATIONS

- Licensed Professional Engineer – State of Texas No. 104778, 2009
- Texas Floodplain Manager – State of Texas No. 1565-09N

JEREMY BLEVINS, E.I.T., CFM

Engineering Associate

Storm Water Management Department email: jblevins@rgmiller.com

SPECIALIZED DESIGN EXPERIENCE

Jeremy Blevins, E.I.T. is a 2007 graduate of Texas A&M University, where he received a Bachelor of Science degree in Civil Engineering. Mr. Blevins joined the staff of R.G. Miller Engineers, Inc. in June 2007 as an Engineering Associate in the Storm Water Management Department. Mr. Blevins has a wide range of experience in storm water management and hydrologic and hydraulic engineering. His experience includes preparation of drainage impact analyses, removal of property from the flood plain via fill, floodplain fill mitigation, and drainage facilities design including detention basins, drainage channels, and closed conduit culverts. Mr. Blevins' experience also includes regional detention basin analysis and drainage impact and design studies for transportation projects.

SPECIFIC PROJECT EXPERIENCE

Project: **E535-01-00 Regional Detention Basin, Jersey Village, Texas.** Regional Detention Basin E535-01-00 is located on a 43-acre tract of land lying immediately north of HCFCD Channel E135-00-00 and west of Rio Grande Road in the west-central portion of Harris County, TX. This project involved the hydraulic and hydrologic analysis of the proposed detention basin as a part of the White Oak Bayou Federal Study. Coordinating with the City of Jersey Village and Harris County Flood Control District, we provided a recommended alternative of the proposed basin to address requirements of the White Oak Federal Study, the use of the facility as park and amenity features, and to provide the detention storage volume which would aid in alleviating flooding the in Jersey Village area. Additionally, we provided avenues for storm water quality and environmental features within the basin and designed an overflow weir structure for storm water to enter the detention basin. Using unsteady HEC-RAS, we modeled the detention basin as a part of the White Oak Bayou watershed to optimize basin performance and to complement portions of the White Oak Bayou Federal Study.
Role: Engineering Associate
Contribution: Responsibilities include analyzing existing drainage systems, evaluating multiple scenarios to provide the recommended alternative for the detention basin, and developing all modeling data while coordinated with multiple interest groups to satisfy needs of each party with the proposed basin, and preparing an existing conditions and alternatives analysis report.

Project: **Spring Stuebner Road Segment C Drainage Analysis, Harris County, Texas.** This project involved the study of effects of the widening of approximately 12,000 feet of Spring Stuebner Road between Interstate Highway 45 and Falvel Road in northern Harris County. Storm water runoff from the area drains to HCFCD Channels K124-02-00, a well-defined man-made channel with significant depth, and K120-03-00, a much smaller, shallower, and less well-defined drainage channel. This project involved extensive hydrologic and hydraulic analyses to offset impacts caused by the improvements to the roadway and the drainage system. Recommendations in the project included approximately 4,200 feet of channel improvements to Channel K120-03-00 to obtain outfall depth to ensure the roadway was passable during a 1% annual chance storm event and the construction of two detention basins. Additionally, floodplain mitigation volume was provided to offset floodplain storage lost due to the channel improvements and improvements to the drainage system along Spring Stuebner Road.
Role: Engineering Associate
Contribution: Responsibilities include the developing all modeling data, analyzing the existing drainage conditions, evaluating drainage improvement alternatives, developing the final drainage plan, and preparing drainage report.

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Engineering Associate
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Project: **Sens Road & Bay Area Blvd. Drainage Analysis, Harris County, Texas.** This project involved a re-study of impacts caused by the construction of Sens Road as an extension of Bay Area Blvd., extending northward from the intersection of Bay Area Blvd. and Spencer Highway to Avenue D in LaPorte, TX. A portion of the improvements drain to HCFCD Channels F216-00-00 and A104-07-00. The original study proposed the construction of a significantly large detention basin that caused by the redirection of flow from the HCFCD Channel F216-00-00 to the Clear Creek watershed and a lengthy span of channel improvements which caused a reduction in flood plain storage loss. The project included providing alternatives for reducing the detention basin size by limiting the scope of channel improvements, not redirecting flow from the F216-00-00 watershed to the Clear Creek watershed, and providing detention basins separately in each respective watershed.
Role: Engineering Associate
Contribution: Responsibilities include the developing all modeling data, analyzing the existing drainage conditions, evaluating drainage improvement alternatives, developing the final drainage plan, computing inflow-diversion data for proposed detention basin and weir, and preparing drainage report.

Project: **Cypresswood Drive Bridge over Unit K159-00-00, Harris County, TX.** This project involved a hydraulic impact analysis for the proposed Cypresswood Drive bridge over HCFCD Unit K159-00-00 in northwestern Harris County. The existing bridge is a two-lane structure, and it is proposed that an additional bridge structure be added to accommodate two additional lanes of traffic. Using the HEC-RAS software program, we modified to FEMA effective model to simulate the effects of the additional bridge and to ensure that no adverse impacts are caused on flood levels upstream of the bridge. Mitigation measures of slope paving were designed to eliminate impacts caused by the new bridge. Additionally, we prepared a request for a Conditional Letter of Map Revision for the proposed bridge.
Role: Engineering Associate
Contribution: Responsibilities include analyzing existing drainage conditions of the project area, development of all modeling data, evaluating proposed drainage improvements, designing the channel slope paving, preparing the drainage report and request for a Conditional Letter of Map Revision.

Project: **Oak Bend Medical Center, Fort Bend County, TX.** The Oak Bend Medical Center is located at the intersection of Grand Estates Drive and the northbound access road of U.S. Highway 59. The project site covers approximately 16.6 acres immediately west of Grand Estates Drive. The project involved the enclosure of an existing TXDOT outfall channel which ran through the property which was to be constructed in two phases. Additionally, the project site was limited by outfall depth, and we provided two options for construction one of which included downstream channel improvements to Middle Bayou to obtain additional outfall depth. Using HEC-RAS, we constructed the existing conditions hydraulic model and modified that model to simulate the effects of enclosing the existing TXDOT outfall channel which ran through the property.
Role: Engineering Associate
Contribution: Responsibilities include analyzing existing drainage conditions of the project area, development of all modeling data, evaluating proposed drainage improvements, designing the channel enclosure, designing proposed downstream channel improvements, and preparing the drainage report.

Project: **Klein ISD Tract on Mahaffey Road, Harris County, TX.** This project involved a drainage analysis for the proposed development of a school site for the Klein ISD. We completed a hydrologic impact analysis to insure that the proposed development did not create adverse impacts downstream. We designed two detention facilities for the site, which included a linear detention facility and a bermed detention basin. The property drains to HCFCD Units M116-00-00 and M112-00-00, which are both tributaries of Willow Creek. We created HEC-HMS models to simulate the existing hydrology of the project site and the surrounding area, and then modified the existing models to simulate the proposed hydrology of the project site.

JEREMY BLEVINS, E.I.T., CFM
Engineering Associate
Storm Water Management Department email: jblevins@rgmiller.com

Role: Engineering Associate
Contribution: Responsibilities include creating all modeling data, analyzing the existing drainage conditions of the watershed, evaluating drainage improvements, designing the proposed detention basins, and preparing the report.

Project: **Shadow Creek South Development, Harris County, Texas.** The Shadow Creek South Development is located immediately south of West Rayford Road, west of HCFCD Channel M104-00-00 and north of Willow Creek in northern Harris County. This project involved the construction of four detention basins which also serve as amenity lakes to offset the impacts caused by the improvements in the proposed development. The basins were designed to have an equalized water surface elevation during storm events and to provide sufficient detention volume to satisfy local drainage criteria. Additionally, measures were taken to ensure that the detention basins were aesthetically pleasing to the community.
Role: Engineering Associate
Contribution: Responsibilities include analyzing existing drainage conditions of the project area, development of all modeling data, evaluating proposed drainage improvements, designing the proposed detention basins and outfall structures, and preparing the drainage report.

Project: **West Greens Business Park Development, Harris County, Texas.** The West Greens Business Park is located north of West Greens Road, east of HCFCD Channel P163-00-00, and south of Greens Bayou in Harris County, TX. Much of the property was located within the 100-year flood plain, and the property was to be filled and removed from the 100-year flood plain. The project included completing a conveyance analysis of Greens Bayou using HEC-RAS, and hydrologic modeling of the proposed detention/mitigation basin to offset impacts caused by the development of the property and the loss of flood plain storage due to fill. A Letter of Map Revision based on Fill was requested from FEMA after the construction of the detention/mitigation basin and flood plain fill was in place.
Role: Engineering Associate
Contribution: Responsibilities include analyzing existing drainage conditions of the project area, developing all modeling data, evaluating drainage improvements, designing the proposed detention basin, preparing the report, and coordinating with FEMA for removal of the property from the 100-year flood plain.

Project: **Dickinson Bayou Flood Plain Delineation Review Study, Galveston County, TX.** This project involved a review of a flood plain delineation study completed by JKC & Associates of the Dickinson Bayou watershed, which includes the cities of Dickinson, Alvin, League City, Santa Fe, and Texas City. Using hydraulic and hydrologic models from the JKC study, we analyzed the methods, assumptions, and results of the study to determine if the results were reasonable and if the flood plain mapped in the study was reasonably mapped. Additionally, we considered the construction of four regional detention basins to be constructed within the watershed to determine which basin would provide the most benefit to the Dickinson Bayou watershed by reducing flood levels in the population centers of the watershed.
Role: Engineering Associate
Contribution: Responsibilities include reviewing all modeling data, analyzing the existing drainage conditions of the watershed, comparing the results with historical studies of the watershed, developing recommendations for the construction of the regional detention facilities, comparing the hydraulic and hydrologic models to real world conditions to verify their reasonableness, and developing recommendations for the Dickinson Bayou flood plain delineation study.

EDUCATIONAL BACKGROUND

- Bachelor of Science, Civil Engineering, Texas A&M University, 2007.

JEREMY BLEVINS, E.I.T., CFM
Engineering Associate
Storm Water Management Department email: jblevins@rgmiller.com

PROFESSIONAL REGISTRATIONS

- Engineer-In-Training – Texas No. 38595, 2007 (Expires 06/18/2015)
- Texas Floodplain Manager – State of Texas No. 1969-10N

Gregory E. Crouch

Vice President, Crouch Environmental Services, Inc.

Education

B.A., Biology, minor in Cultural Anthropology, 1974, Sam Houston State University
M.S., Biology/ Ecology, 1977, Stephen F. Austin State University
M.B.A., Business, 1990, University of Texas at Austin
Duke University, Nichols School of Environmental and Earth Sciences, 2004-05, NEPA Courses
AHERA Asbestos Inspector Certification
OSHA 40-Hour HAZWOPER Training
Wetland Delineation Training

Experience

Mr. Crouch has 31 years of experience conducting biological assessments, including wetlands delineations and endangered species surveys. He has significant permitting and regulatory liaison experience, including USACE Section 404/401 permits for the largest real estate developments on the Texas coast. He has also performed hundreds of environmental site assessments (Phase I and II), asbestos assessments, prepared dozens of SWPPP and SPCC plans, prepared a large number of NEPA documents (CEs, EAs and EISs), and performed a wide variety of general environmental consulting services for both private and public-sector clients.

His recent experience includes work on the biological sections of an EIS for a major container terminal on Galveston Bay, wetland delineation of a 17-square mile site, work on the biological information for two EAs for major highway or roadway expansions in Texas, and work on the biological sections of an EIS for a major LNG terminal on the Texas coast. He also recently performed an extensive wetland investigation on a site on the Texas coast that is destined to become a nature preserve near Freeport, Texas.

In 2008 and 2009, he managed the environmental investigations and permitting for 43,000 acres of planned development on the Texas coast.

Project Experience:

Environmental Manager for four 1,000-acre (plus) residential and marina developments on the central Texas coast. He has guided clients through the arduous permitting that enabled them to acquire the following:

- **TGLO permits for piers and breakwaters,**
- **USACE Section 404/401 permits for affecting Waters of the U.S.,**
- **Section 7 consultations for Endangered Species with USFWS,**
- **TCEQ water quality monitoring plans,**
- **Marina flushing analyses for NMFS and TPWD,**
- **Essential Fish Habitat Studies for NMFS,**
- **Cultural Resource Surveys that satisfy THC and USACE guidelines,**
- **Seagrass and Oyster Bed Surveys for NMFS,**
- **Bird Surveys for USFWS, including season monitoring for Whooping cranes,**

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Environmental Impact Statement, Bayport Container Terminal Project, Port of Houston Authority / U.S. Army Corps of Engineers, Harris, Galveston and Chambers Counties, Texas - Mr. Crouch participated in the preparation of the biological sections of the Environmental Impact Statement for the Bayport Container Terminal in Harris County, Texas. He also performed wetland delineations on the proposed Bayport site and coordinated with the Galveston District of the USACE on wetland verifications on the Bayport site.

Project Manager, Wetlands Design & Construction, 420-Acre Wildlife Refuge, Baytown, Harris County, Texas - Mr. Crouch was Scientific Advisor and Project Manager for the design of a Master Plan for a 420 acre wildlife refuge that became the City of Baytown's "Baytown Nature Center". This project involved a design to create a wildlife refuge in an area that was once a residential neighborhood condemned due to land subsidence problems in 1983. The design called for the demolition of existing residences, the creation of fresh water and saline marshes, enhancement of upland forests, creation of live oak mottes, installation of hiking trails and construction of observation shelters.

Project Manager, Coastal Marsh Environmental Impact Analysis, Louisiana - To support the Plaintiff's attorneys in a multi-state, multi-company, multi-million dollar lawsuit concerning alleged damage to coastal wetlands, Mr. Crouch surveyed more than 6,000 miles of pipeline corridors in southern Louisiana. Utilizing aerial surveys, reconnaissance, GIS and a multi-disciplinary team of scientists, Mr. Crouch created a system for grading impacts on marshes that reduced project costs and completed the project in a timely manner. The project involved analyses of complex freshwater and saltwater marshes and the influence of saltwater intrusion on freshwater marsh ecosystems cause by pipeline construction activities.

Project Manager, Wetland Delineation, Wah Chang Tract, Port of Houston Authority, Harris County, Texas - Mr. Crouch served as Project Manager for a wetland delineation of an approximately 200+ acre tract in east Harris County. Completion of the project included accompanying the USACE on a site visit to verify the results of the delineation.

Project Manager, Wetlands Mitigation Site Selection, Wetland Permitting, Design and Construction, 60-Acre Brownwood Marsh Restoration Project, Baytown, Harris County, Texas - Mr. Crouch managed a site selection study, two cultural resource surveys, soil sampling, hydrologic study, hazardous material investigations and design and construction of a constructed wetlands area for the French Limited Task Group. The French Limited Superfund Task Group, a CERCLA PRP GROUP with interests in the area, funded the project. Mr. Crouch communicated and negotiated extensively with a multi-agency regulatory committee, comprised of representatives from U.S. EPA, U.S. Fish & Wildlife Department, National Marine Fisheries Service, Texas Parks and Wildlife Department, Texas Natural Resource Conservation Commission (now the TCEQ), Texas General Land Office, Texas State Historical Preservation Office and the City of Baytown Parks and Recreation Board. He secured a 404/401 permit from the Galveston District, USACE for this project.

Project Manager - Wetland Delineation, Port of Houston Authority, Barbours Cut Shoreline, Harris County, Texas - Mr. Crouch served as Project Manager for a wetlands delineation performed for the Barbours Cut shoreline erosion and stabilization project. This delineation has been verified by the USACE and an Individual 401/401 Permit was obtained.

Project Manager, Endangered Species and Wetlands Surveys, TEPPCO 54-Mile Pipeline, Louisiana and Arkansas - Mr. Crouch was Project Manager for a 54-mile pipeline project that crosses northern Louisiana and southern Arkansas. The project included conducting endangered species surveys, wetlands delineations of over 100 wetlands and writing the project's SWPPP.

Project Manager, Site Remediation, J.C. Pennco State Superfund Site, San Antonio, Texas - This abandoned recycling facility, under the management of the Texas Natural Resource Conservation Commission (now the TCEQ) contained more than 500 drums of hazardous and toxic materials, and more than 10,000 cubic yards of contaminated

soil in two operable units. Soil contaminants included POLS, acids, food waste, radiological material, solvents pain and metals. As prime contractor to TCEQ, Mr. Crouch managed drum inventory and characterization, waste segregation, overpack of leaking drums, site security and runoff control. This project for the TCEQ was completed ahead of schedule and under the projected budget.

Storm Water Pollution Prevention Plans, Nationwide - Mr. Crouch has personally prepared dozens of SWPPPs for industrial facilities nationwide. The industrial facilities include valve manufacturing and refurbishing, roadways, and pipelines. These SWPPPs have been prepared for both existing facilities and facilities that are being constructed.

Endangered Species Surveys, Nationwide - Mr. Crouch has performed over 100 surveys for listed species nationwide. Projects include proposed industrial facilities, highways, city streets and roadways, schools, residential developments, and detention basins. He has performed coordination with numerous state and federal agencies regarding listed species.

Project Manager, TRANSCO 630-Mile Pipeline Project (Endangered Species & Wetlands Surveys) - Project Manager for a 630-mile natural gas pipeline cultural and natural resource survey and environmental impact report. The pipeline crossed Texas, Oklahoma, Arkansas and Louisiana. Mr. Crouch managed a multidisciplinary team of scientists, archeologists and field technicians to determine the potential environmental and natural resource impacts from construction and operation. Although this was a large and complex project, Mr. Crouch was able to mobilize and manage a team that completed the work in less than four months from initiation to Notice to Proceed.

Components of the project included wetlands delineation, endangered species and cultural resources surveys. Mr. Crouch managed and co-authored the environmental impact report resulting from this project, which the client successfully presented in a FERC filing.

Environmental Assessments--Mr. Crouch has completed over 200 Phase I Environmental Site Assessments nationwide for a variety of private and public clients. Sites evaluated have included residential developments, commercial developments, vacant/undeveloped land, highways, roadways, and industrial sites.

He has completed numerous Phase II Environmental Site Assessments nationwide. Such projects have included asbestos contamination inspection and sampling, lead-based paint sampling and surface and subsurface water quality sampling.

Project Manager, CONOCO Compressor Station Mercury Cleanup, Egan, Louisiana (Site Remediation)
Mr. Crouch managed the assessment, remedial design and remedial action of 14 sites associated with a major interstate pipeline compressor station. Site contaminants were principally elemental mercury from leaking manometers. Site conditions complicating the assessment included shallow groundwater and numerous utility pipes and conduits traversing the area. Field activities (investigation and remediation) were conducted in Level C Personal Protective gear.

Project Manager, TEPPCO Pipeline Rupture, Red River, Louisiana (Wetlands Negotiations with Regulators)
Mr. Crouch managed the biological aspects of restoring a large freshwater wetland that was severely impacted by the emergency construction of two 20-inch pipelines. A hydrologic change of the Red River caused the existing pipelines to give way, spilling petroleum products into the Red River. The construction activity necessary to place new pipelines across the river impacted a large freshwater wetland. Mr. Crouch provided the client advice on how to restore the wetland and negotiated with the federal regulatory agency on behalf of the client. Mr. Crouch assessed the post-construction wetland restoration, and advised the client on how to precede in future negotiations with Federal regulators.

Project Manager, TEPPCO Wetland Project, Mont. Belvieu, Texas (Wetlands Design and Construction)

Mr. Crouch managed a project for TEPPCO that required the destruction of an existing wetland due to industrial activity. Mr. Crouch negotiated on behalf of the client with the U.S. Army Corps of Engineers in mitigating these damages. Mr. Crouch designed and constructed a 7.0-acre wetland that was located in a heavily wooded mesic bottomland habitat. Small, isolated, depressional wetlands were excavated on 30 ft. centers throughout the construction area and the existing trees and shrubs were preserved.

Project Manager, FDIC Biological Surveys, Prince Georges Co., Maryland (Endangered Species and Wetlands Surveys)
Mr. Crouch conducted a combined wetlands survey, wetlands delineation and endangered species survey (for bald eagles) on two sites near Washington D. C. in Maryland. This project was completed under budget and on time for the client.

Project Manager, FDIC Biological Survey, San Diego, California (Endangered Species and Wetlands Surveys)
Mr. Crouch conducted a wetlands survey and endangered species survey for the California Gnatcatcher. No wetlands were found at this hilly, rocky site, however, habitat capable of supporting the California Gnatcatcher was observed and noted. This project was completed within budget and on time for the client.

Project Manager, TEPPCO Pipeline Survey at Houston Intercontinental Airport, Texas (Wetlands Survey)
Mr. Crouch conducted a wetlands survey on a pipeline right-of-way that traversed a portion of Houston's Intercontinental Airport. Wetlands were located and delineated.

Project Manager, EXXON Land Development Company, Wetlands Determination on a 1,400-acre site near Conroe, Texas
Mr. Crouch conducted a wetlands determination on a heavily forested 1,400-acre site. Over twenty wetlands were located and delineated.

Project Manager, The Western Companies, SPCC Plan Preparation, Nationwide
Mr. Crouch served as Project Manager in the preparation of Spill Prevention Control and Countermeasure Plans for approximately 40 different facilities owned by The Western Company (now BJ Services facilities).

Co-Project Manager, D H. Texas Development, Wetlands Delineation and Permitting, T&E Species Survey, etc.
Mr. Crouch performed all environmental studies and testing for two 1,000-acre properties, located in Palacios and Rockport, Texas, respectively. This work included oyster bed, seagrass bed, and essential fish habitat studies and mapping.

Co-Project Manager, Falcon Pt. Ranch, Wetlands Delineation and Permitting, T&E Species Survey, Etc.
Mr. Crouch managed all environmental studies and testing for the 6,000-acre ranch located near Seadrift, Texas. This work included oyster bed, seagrass bed, and essential fish habitat studies and mapping.

Co-Project Manager, KB Homes, Wetlands and T&E Species Surveys
Mr. Crouch managed the environmental investigation of several sites around Houston. The studies were for wetlands determinations and listed species.

Project Manager, City of Baytown, Master Plan for the Baytown Nature Center
Mr. Crouch managed the development of a Master Plan for the 420-acre that involved the planning for hike and bike trails, construction of salt marsh, freshwater wetlands, roads, bridges, and observation platforms. The plan also is a resource for increasing bio-diversity of fauna and flora in the nature center.

Co-Project Manager, City of Pearland, Construction of 4.84-acres of freshwater wetlands

Mr. Crouch managed the construction project that included the installation of hundreds of trees and thousands of emergent wetlands vegetation at two adjacent sites for the City of Pearland.

Co-Project Manager, Port of Houston Authority, Construction of a 3.2-acre salt marsh
Mr. Crouch managed the construction of a 3.2-acre salt marsh as mitigation for PHA's shoreline stabilization project on the Houston Ship Channel.

Co-Project Manager, City of Port O'Connor, Wetlands Delineation and Permitting
Mr. Crouch managed the delineation of a 60-acre park prior to construction of a parking lot, boardwalk, and bird observation platform in the park.

EDUCATION
Bellaire High School
Blinn College
Houston Community College

AFFILIATIONS
Texas Society of Professional Surveyors (Gulf Coast Chapter)

PROFESSIONAL STATUS
Registered Professional Land Surveyor – Texas Number 5745
TxDOT Pre-Certification Employee Sequence No. 000014209

EXPERIENCE
Brian Wilson is a Registered Professional Land Surveyor (R.P.L.S.), Texas Registration Number 5745 and the Survey Manager for Miller Survey Group. He is highly experienced in boundary, route, topographic and construction surveys with extensive experience in land development projects, plus subdivision platting and submittals for recordation process.

Mr. Wilson has worked extensively for the City of Houston, Harris County and surrounding counties as the manager of the firm. He serves as the Principal-in-Charge, oversees, and manages the firm's Quality Assurance programs of all projects.

PROJECTS

James Glanville-Jacintoport Boulevard, Harris County, Completed: 2007
Numerous tracts and easements with hundreds of recorded instruments were reviewed, plotted, and shown on the twenty plus boundary surveys and easement exhibits prepared for the project. Mr. Wilson personally checked and certified to each boundary survey.

ALMEDA/OST TIRZ – Holman Street Reconstruction Program
Provided right-of-way, topographic and utilities survey, and mapping from U. S. 59 to Scott Street (2 miles), which was completed in 2009

City of Houston-Aldine-Westfield Road from Heaney Drive to Trenton Road, Harris County, Completed 2006
Project Manager assigned to reviewed, plot, and fit together the recorded instruments of over ninety (90) tracts of land on both the east and west sides of Aldine-Westfield Road, and twenty-two (22) crossing or intersecting roads. Also, prepared a deed sketch and coordinate file to aid the Field Crews in finding and recording the location of existing monumentation. GPS was used to set Horizontal and Vertical control points throughout the project. Total Stations were utilized to traverse between control points and to set intermediate points and tie City of Houston Monuments, and existing property corners. The field data was then processed and the completed maps were used to determine the existing and proposed right of way lines. Capped 5/8-inch iron rods were set at the parcel corners, angle points, points of curvature, and points of tangency delineating the new right of way lines. Legal Descriptions were prepared by Mr. Wilson for each parcel taken for the new right of way lines.

Harris County Engineering-Cypress Rosehill Road, Harris County, Completed: 2007
Miller Survey Group's portion of the project of Cypress Rosehill Road Right-of-Way Acquisitions, ran from north of Manor Bend to south of K-Z Road. Brian Wilson was the Project Manager overseeing the project. The project required reviewing, plotting, and piecing together the recorded instruments for approximately thirty-five (35) tracts of land on both the east and west sides of Cypress Rosehill Road, and crossing or intersecting roads. A deed sketch and coordinate file to aid the Field Crews in finding and recording the location of existing monumentation. GPS was utilized to set Horizontal and Vertical control points throughout the project.

Marwood Development-Fairpark of Pleak Village, Fort Bend County, Completed: 2007
As Project Manager, Mr. Wilson prepared a Topographical Survey and Hydrology Study on 757 acres for a private developer. Also responsible for preparing a deed sketch and coordinate file to aid the Field Crews in finding and recording the location of existing monumentation. Utilizing GPS to verify the location and accuracy of the boundary monumentation, establish the points of intersection, and record elevations, for a 100-foot by 100-foot grid, establish the location of, and record cross section elevations of Big, Coon, and Seabourne Creeks based on 100-foot intervals and to establish the location of, and record cross section elevations of Highway 36, Band Road, and Ustinik Road, based on 100-foot intervals. The final Topographical Survey Plat was prepared using AutoCAD Land Desktop.

DAVID MOUTON
Project Coordinator
Storm Water Management Department email:dmouton@rgmiller.com

EXPERIENCE

Mr. Mouton joined the staff of R.G. Miller Engineers Inc. in December 2003 as the Project Coordinator for the firm's Storm Water Management Department. Before coming to R.G. Miller Engineers, Inc., Mr. Mouton was with Dodson & Associates, Inc., serving as GIS/CAD Specialist between 1990 and 2003. He has participated in a wide range of projects in the fields of hydrology and hydraulics, including development of engineering exhibits, development of hydrologic and hydraulic computer models for flood plain studies, impact studies, detention design analyses, and other water resources projects. He has developed many successful FEMA submittals, including requests for Conditional Letters of Map Revision, which are based on proposed projects, and Letters of Map Revision, which are based on post-project (as-built) conditions. Mr. Mouton has also received specialized training and experience in Geographic Information Systems, including the use of ArcGIS, ArcInfo, MapInfo Professional, and other applications.

PROJECTS

Brays Bayou Re-Study, Harris County, Texas

The results of this study included updated hydrologic and hydraulic modeling data for the watershed, as well as updated digital flood plain mapping data. All hydraulic modeling and mapping products were based on LIDAR topographic data. In addition to providing final modeling and mapping data for Brays Bayou and tributaries, the study established methods, procedures, criteria, and requirements used in the Tropical Storm Allison Recovery Project. Mr. Mouton used ESRI software to process LIDAR data for use in hydraulic models. He used ArcView and ArcInfo to analyze output from hydraulic models to establish the extents of 1% annual chance (100-year) flood plain boundaries. Mr. Mouton also produced the final maps for the re-study project using the ArcView software package.

Grant Road and Kitzman Road Drainage and Wetland Mitigation Project, Harris County, Texas

This project involved the design of improvements needed to restore storm drainage interrupted by prior fill activities with special provisions to allow wetland mitigation facilities to be established on two separate properties. Mr. Mouton served as senior project coordinator and led the design team for the project in the preparation of construction plans for wetland mitigation facilities on two separate sites.

Regional Basin T501-01-00, Harris County, Texas

Work items in the scope of work include definition of the detention basin service area and preparation of a plan for expanding the existing basin to its ultimate size. Coordination with Harris County Precinct 3 is required, as the precinct has established a park on the detention site. RGME is working with the HCFCD and the Precinct to develop an expansion plan for the detention facility that provides detention storage while avoiding damage to existing trees and landscaping, maximizing an amenity lake on the site, and providing opportunities for additional park facilities. Mr. Mouton provides all GIS expertise and oversees the preparation of design documents for the project, including planning layouts for the detention facility, watershed maps, and other work products.

Regional Basin E500-03-00, Harris County, Texas

This project involved the expansion of a regional detention facility to a volume of nearly 1,000 acre-feet. The basin is roughly rectangular in shape with a wet bottom split into two portions by an existing pipeline easement. The configuration developed by RGME provides wide, gently-sloping shelves and varying water depths within the basin bottom so that new wetlands may be established. When the basin is completed, a total of 7.0 acres of new wetlands areas will be created, and the area of open water within the basin footprint will be 32.3 acres. An existing cultural site located in a corner of the site will be left undisturbed. Mr. Mouton provides all GIS

expertise and oversees the preparation of design documents for the project, including planning layouts for the detention facility, watershed maps, and other work products, as well as prepared the necessary construction documents, coordinated field survey and other activities related to the project, and developed construction cost estimates.

Regional Basin E535-01-00, Harris County, Texas
Major components of the project are being sized and laid out, including flow a basin grading plan, diversion and release structures, water quality features, and park facilities, which will include at minimum an amenity lake and hike-and-bike trail. RGME is also working with the HCFCD and City of Jersey Village to identify and establish a route for an existing street to be extended across the southern portion of the E535-01-00 detention site. Mr. Mouton provides all GIS expertise and oversees the preparation of design documents for the project, including planning layouts for the detention facility, watershed maps, and other work products.

Northeast Oyster Creek Master Drainage Plan, Fort Bend County, Texas
This project involved the development of an overall master drainage plan for a small watershed in Missouri City, Texas with a number of special problems regarding outfall capacity. The final plan incorporated channel improvements, regional detention, and environmental features in a drainage system capable of accommodating runoff from a 100-year, 24-hour storm event.

FIS Update Studies & Master Drainage Plans for the City of Lufkin, Texas
This project, which was 50%, funded by the Texas Water Development Board, called for the development of complete hydrologic and hydraulic models for several major watersheds, the identification of existing flooding problems, and the development of recommendations regarding cost-effective interim and long-term solutions. Digital data files developed using aerial photogrammetry were used for flood plain mapping and preliminary design of flood protection improvements. Possible sources of funding were identified, and a detailed implementation plan was prepared for both interim and ultimate conditions improvements. Study results were submitted to FEMA.

Dickinson Bayou Update Study, Galveston County, Texas
This project, which was 50% funded by the Texas Water Development Board, involved the development of a complete hydrologic and hydraulic models for a major watershed with a total drainage area of about 106 square miles. The project identified existing flooding problems and recommended cost-effective interim solutions. In addition, a complete analysis of ultimate development was prepared, with recommended designs for future drainage improvements. Possible sources of funding were identified, and a detailed implementation plan was prepared for both interim and ultimate conditions improvements.

Northgate Crossing Levee & Development, Harris County, Texas
This project involved the completion of historical flooding investigations, a forensic analysis of the October 1994 flood in northern Harris County, a major hydraulic analysis of an existing levee, and the development of an interior flood routing analysis for areas protected by the levee. A FEMA Letter of Map Revision (LOMR) application was also prepared.

EDUCATION

- 134 Hours of Undergraduate Work at the North Harris Community College, University of Southwestern Louisiana, and the University of Houston.
- Workshop on "Basic Cartography of GIS Professionals."
- Workshop on "Map Design for GIS Specialists."

ATTACHMENT 12

PROPOSALS

Proposals from Proposed Survey &
Environmental Sub-Contractors

r.g. miller
engineers

MILLER
SURVEY★GROUP

January 6, 2011

E-mail:dbarrett@rgmiller.com

Mr. Duane Barrett
R. G. Miller Engineers, Inc.
12121 Wickchester Lane, Suite 200
Houston, Texas 77079

Re: **Proposal for surveying services in connection with proposed study of Rabbs Bayou and Gapps Bayou watersheds east of Richmond, Texas, and south of Highway 59 in Fort Bend County, Texas.**

Dear Duane,

This is our Letter of Proposal to provide our services as requested for the above referenced bayous, for which we will provide the following:

Rabbs Bayou - Approximately 8 miles in length

1. Provide cross-sections at approximately 1000' intervals (42 sections) to define bayou configuration.
2. Provide 2 cross-sections at bridge and culvert crossing, top of roads and details of each structure (approximately 18 crossings).
3. Provide a drawing and digital file of all field data captured.

FEE = $20,520.00

Gapps Bayou - Approximately 6 miles in length

1. Provide cross-sections at approximately 1000' intervals (32 sections) to define bayou configuration.
2. Provide 2 cross-sections at bridge and culvert crossing, top of roads and details of each structure (approximately 14 crossings).
3. Provide a drawing and digital file of all field data captured.

FEE = $14,800.00

TOTAL FEE = $35,320.00

I am certainly looking forward to working with you on this project and if I can provide additional information or be of further service, please do not hesitate to contact me. Should this proposal be acceptable to you please sign, date, and return a copy to me for my file (fax 713-413-1944). This will serve as your acceptance of the terms contained herein and also will serve as our written authorization to proceed.

Respectfully submitted:
Miller Survey Group

Brian E. Wilson, RPLS
Survey Manager

Accepted:

By:
Date:

1760 West Sam Houston Parkway North ★ Houston, Texas 77043
Phone 713-413-1900 ★ Fax 713-413-1944

402 Teetshorn Street · Houston, Texas 77009
P. 713.868.1043
F. 713.863.7944
www.crouchenvironmental.com

CROUCH ENVIRONMENTAL SERVICES, INC.



January 5, 2011

Mr. Duane Barrett, P.E.
R. G. Miller Engineers, Inc.
12121 Wickchester Lane, Suite 200
Houston, Texas 77079

RE: Proposal for Environmental Services
Texas Water Development Board Flood Protection Grant Application
Rabbs Bayou and Gapps Bayou Watershed Studies
Fort Bend County, Texas

Dear Mr. Barrett:

Thank you for giving Crouch Environmental Services, Inc. (CESI) the opportunity to submit a proposal to provide environmental consulting services for a proposed flood protection grant application with the Texas Water Development Board. The grant application encompasses flooding studies for the Rabbs and Gapps Bayou watersheds in Fort Bend County, Texas.

Introduction

R.G. Miller Engineers, Inc. (RG Miller) is developing a Texas Water Development Board (TWDB) flood protection grant application for Fort Bend County in conjunction with future flooding studies for the Rabbs and Gapps Bayou watersheds. These watersheds cover approximately 10.6 and 7.9 miles, respectively. The purpose of the flooding studies is to identify potential flooding problems and develop plans for protecting at-risk areas.

As part of these flooding studies, RG Miller has requested assistance from CESI to perform Phase I investigations for these watersheds. These Phase I investigations include information on existing wetlands, habitats, endangered species, potential hazardous materials investigations, and cultural resource constraints within these watersheds. These environmental constraints and resources would be analyzed and documented to evaluate possible areas of avoidance for any proposed flooding improvements needed within each of these watersheds.

Based on our discussions with RG Miller, these Phase I investigations are a planning tool for the flooding studies. Detailed on-site impact assessments and potential compensatory mitigation would not be performed during these investigations. Pursuant to our conversations, CESI proposes the scope of work for the proposed project as outlined below.

Scope of Work – Phase I Investigations

It is assumed that CESI will be provided right-of-entry for specific properties that might require further investigation and inspection. In particular, these specific inspections may be needed to confirm the presence and absence of listed species habitats, waters of the U.S., including wetlands, and/or verify potential hazardous materials locations. Ground-truthing for potential cultural resource constraints is not included in this scope of work. In the event right-of-entry is not available for the targeted properties, CESI will use all reasonable resources and best professional judgment for potential environmental constraints within these areas.

Background Studies

CESI will coordinate with RG Miller regarding any previous studies performed by Fort Bend County, the cities of Sugarland, Richmond and Rosenberg, and/or the Texas Water Development Board. These studies may include previous flood control studies, environmental assessments, planning studies and/or project-specific studies performed within each of these watersheds. These studies would be used in the overall evaluation of potential environmental constraints within the project study boundaries.

CESI will coordinate with the US Army Corps of Engineers – Galveston District (USACE) to determine the number and extent of Section 404 Clean Water Act permits issued within each of the watersheds. CESI will coordinate with the Texas Department of Transportation - Houston District (TxDOT) to determine if there have been any National Environmental Policy Act (NEPA) studies conducted on any of the roadways within the project study areas. Typically, TxDOT will collect environmental constraint information within their project boundaries and limits that may assist in the identification of environmental constraints for the grant application proposal.

The results of the coordination and background study review will be documented in a brief memorandum to RG Miller and include appropriate graphics and maps depicting potential environmental constraints within each watershed.

Hazardous Materials Investigations

CESI will perform a screening level assessment of potential hazardous materials constraints within each of the watersheds. These screening level assessments would include the following:

- Obtain and review regulatory database search for the project study areas;
- Obtain and review existing and previous land uses, US Geologic Survey (USGS) topographic maps, aerial photographs, and Sanborn Fire Insurance Maps (if available);
- CESI during review of the aerial photographs will identify potential site conditions that may exhibit hazardous materials concerns;
- CESI will visually inspect any properties, provided right-of-entry is available, to verify site conditions for up to 10 locations that may have potential hazardous materials concerns. CESI will verify any structures at these sites, such as underground and above-ground storage tanks;
- Perform interviews with various agencies and property owners, as deemed necessary;
- Identification of any immediate risk to public health, safety or the environment;
- Provide recommendations on the need for additional testing to confirm and evaluate any potential contaminants;
- Identification of the presence or likely presence of an environmental condition that may trigger an environmental liability on, restrict the use of, or affect the marketability or value of a property.

For the purposes of this scope of work, it is assumed that no more than 10 targeted properties (total) will be investigated for both of the watersheds. As outlined above, it is assumed that right-of-entry will be provided by RG Miller to these 10 properties, if available.

The information gathered will be evaluated and the findings will be documented in a Hazardous Materials Site Assessment Report. Should the evaluation determination additional investigation and/or testing is required, this can be done by CESI at additional cost in accordance with the attached Billing Rate Schedule.

Listed Species Investigations

The threatened and endangered species (T&E) assessment will be performed to document the listed species potentially present within the project study area, the habitats available for these species, and potential impacts to

listed species, if applicable. For the purposes of this scope of work, it is assumed no more than 10 targeted properties (total) will be investigated for both of the watersheds. As outlined above, it is assumed right-of-entry will be provided by RG Miller to these 10 properties, if available.

Coordination will be performed with the US Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD). Coordination with the USFWS will consist of obtaining a recent listed species list for Fort Bend County. Coordination with TPWD will consist of requesting data from the Natural Diversity Database (NDD) which contains data on potential occurrence and/or habitat present for listed species and a current species list for Fort Bend County.

CESI will review resources such as the soil survey for Fort Bend County, endangered species lists maintained by the USFWS and TPWD, the Vegetation Types of Texas, and other relevant published resources to assess potential habitats for listed species within the project study areas. CESI, based on this information and limited site investigations, will document the findings in a T&E Assessment Report. The report will also include Geographic Information System (GIS) formatted maps depicting potential listed species habitats, if present. These graphics will assist in the planning for potential improvements in the project study areas. A Biological Assessment, as mandated under Section 7 of the Endangered Species Act, is not included in this scope of work.

Waters of the U.S., including Wetlands Investigations

CESI will perform a review of potential locations of waters of the United States, including wetlands, within the project study area. This review will consist of the following tasks:

- Review available resources such as:
  - Soil survey information,
  - USGS topographic quadrangle maps,
  - Historical and current aerial photography,
  - National Wetland Inventory maps,
  - USGS National Hydrology Datasets, and
  - Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps.
- Based on this review, CESI will identify potential locations for waters of the U.S., including wetlands, within the study areas.
- CESI will identify and investigate up to 10 locations where waters of the U.S., including wetlands, may be present would require right-of-entry from the property owner. If right-of-entry is not available for these properties, CESI will use best professional judgment to assess the potential occurrence of waters of the U.S., including wetlands, at these locations. CESI will estimate the locations and boundaries of any waters of the U.S., including wetlands that may be present at these locations. The estimated boundaries will be surveyed utilizing Global Positioning System (GPS) equipment.

CESI will prepare a brief summary report documenting the findings of the resource review and site investigations. This brief summary report will include the following:

- Introduction and Background
- Methods
- Results
- Discussion
- Conclusions
- Figures, including various maps depicting potential waters of the U.S., including wetlands, locations.

The brief summary report is not intended to be submitted to any resource or regulatory agency for verification. It will provide information to assist in the planning for any proposed improvements within the study areas. Detailed jurisdictional delineations can be performed by CESI at additional cost in accordance with the Billing Rate Schedule attached to this proposal.

Cultural Resources Investigations

An archeological resources review generally consists of a screening evaluation by a professional cultural resources firm in order to determine the potential presence of these resources within a defined area. This review includes a records search (desk-top assessment) for cultural resources within the study areas and preparation of an Archeological Assessment Letter summarizing the assessment. CESI will subcontract with Moore Archaeological Services to perform cultural resources work for this proposal. CESI will provide limited oversight and will review the Archeological Assessment Letter prior to submittal to RG Miller.

If it is determined that cultural resources are present in the study areas that warrant further investigation, such as a pedestrian survey, this can be accomplished at additional cost.

Cost Estimate:

CESI proposed to perform the above-referenced services for a time and materials basis, not-to-exceed **$33,500.00**. A breakdown of the individual tasks is outlined below.

Task	Cost
Background Studies	$5,000.00
Hazardous Materials Investigations	$11,510.00
Listed Species Investigations	$6,000.00
Waters of the U.S. Investigations	$7,980.00
Cultural Resources Investigations	$3,010.00
Total	$33,500.00

This proposal presents the normal elements of environmental services that are typically required to complete this type of project based on the information provided at the time of the proposal. No project task will be performed without the prior approval of Client. Additional services would be performed at additional cost. This Proposal is valid for ninety (90) days from the date of this letter. This project will be performed on a time and materials basis in accordance with the General Terms and Conditions and Billing Rate Schedule attached to this proposal.

Thank you for requesting a proposal for this project. Please call me or Mr. Greg Crouch at (713) 868-1043 if you should have any questions. We look forward to working with you on this project.

Sincerely,

David Young
Senior Environmental Consultant

Enclosures: General Terms and Conditions
Billing Rate Schedule

cc: CESI proposal file

CROUCH ENVIRONMENTAL SERVICES, INC.

Standard Billing Rate Schedule

Environmental Regulatory Compliance and General Consulting Services:

Title	Hourly Rate
Principal	$140
Senior Project Manager	$125
Project Manager	$95
Senior Environmental Planner/Scientist	$75
Associate Environmental Planner/Scientist II	$60
Associate Environmental Planner/Scientist I	$50
Assistant Environmental Planner/Scientist	$40
Senior Communications Specialist	$90
Associate Public Involvement Expert	$60
Associate GIS Specialist	$60
Assistant GIS Specialist	$50
Administrative Assistant	$40

*Delivery of expert testimony or depositions will be made at 150% normal rates.

Direct Costs, Travel, and Equipment

Item	Unit Price
Photo copies (Black and White 8.5x11 / 11x17)	$0.15 / $0.20 / ea
Photo copies (Color 8.5x11 / 11x17)	$1.00 / $1.50 / ea
Postage	Standard Postage Rates
Deliveries	$20.00 / package
Long Distance	$0.20 / minute
Facsimilies	$1.00 / pg
Photographs (35 mm film)	$15.00 / 24-roll
Equipment	
Vehicle mileage (or current IRS 2006 Standard Mileage Rates)	$0.50 / mile
Boat and Motor (including trailer), plus direct fuel cost	$400.00 / day
ATV (including trailer)	$120.00 / day
Digital Still Camera	$10.00 / day
Digital Video Camera	$25.00 / day
Global Positioning System (Trimble GeoXT)	$120.00 / day

Summary of Terms (see General Terms and Conditions for additional details):
Invoices are payable within 15 days of invoice date unless otherwise approved by CESI. Late payment is subject to a 2 percent per month administrative fee. We reserve the right to require a retainer at our discretion. Subcontractors, expenses, and other direct costs will be charged at actual cost plus a 10% administrative burden fee.

Rates apply from January 1, 2011 through December 31, 2011

CLIENT CONTRACT
GENERAL TERMS AND CONDITIONS

DEFINITIONS: "CESI" shall mean Crouch Environmental Services, Inc. and "OWNER" shall mean the client named in the Agreement. "Agreement" shall mean the authorizing document, such as the contract, purchase order, or approved CESI proposal, allowing CESI to proceed with services provided to OWNER.

STANDARD OF CARE: The standard of care applicable to CESI's services will be the degree of skill and diligence normally employed by professionals or consultants performing the same or similar services as CESI provides to OWNER under the Agreement.

ACCESS: The OWNER shall furnish all access to property and rights-of-way for the performance of CESI's services.

ESTIMATES: Estimates of cost of construction, financing, acquisition of real or personal property or rights-of-way shall be made in accordance with generally accepted professional practices and procedures. However, CESI has no control over construction costs, competitive bidding and market conditions, nor costs of financing, acquisition of real or personal property or rights-of-way; and CESI does not guarantee the accuracy of such cost estimates as compared to actual cost or bids.

CONSTRUCTION PHASE: CESI shall not be responsible during the construction phase for the construction means, methods, techniques, sequences or procedures of construction contractors, installers or suppliers, or the safety precautions and programs incident thereto.

PAYMENT and FEES: Payments shall be made within fifteen (15) days by the OWNER to CESI based on invoices submitted by CESI. The OWNER shall make payment, in the event of a paid-when-paid contract, within five (5) days of OWNER receiving payment. The OWNER shall also pay CESI a late payment charge for any payments not made within fifteen (15) days of the date of applicable invoices at the rate of 2.0% per month. Subcontractors, expenses, and other direct costs will be charged at actual cost plus a 10% administrative burden fee.

TIME OF PERFORMANCE: CESI shall commence work upon receipt of written notice to proceed from the OWNER and shall complete the work within the time period set forth in the Agreement, subject to any delays caused by the OWNER, other agencies involved in the work or any other parties or events not under the control of CESI.

SUSPENSION OR TERMINATION: In the event the work is terminated or suspended by the OWNER prior to the completion of the Agreement, CESI shall be paid an equitable amount proportional to the services rendered and expenses incurred through the date of termination or suspension.

LEGAL COST, PERMITS, FEES, ETC.: The OWNER shall furnish or compensate CESI for all legal services and opinions, and for permits, review fees, etc., necessary for the performance of the services to be rendered by CESI.

CHANGES: The OWNER may, at any time prior to the completion of the services, direct, in writing, any changes to the services, including but not limited to the revision of the scope of services, time period, or schedule of performance. CESI shall perform such changes to the services as directed by the CLIENT in writing and shall be paid for such services at rates established by the Agreement, or as may be otherwise agreed between the OWNER and CESI. CESI will not be responsible for changes in regulations, codes, statutes, rules, or guidance governing the services provided by CESI that occur during or after the performance of services.

INDEMNIFICATION: Except as stated below, CESI shall indemnify and save harmless the OWNER from claims, losses, lawsuits or expenses caused directly by CESI's sole negligent acts and errors or omissions in the performance of CESI's services hereunder. To the fullest extent permitted by law, with respect to claims, damages, losses and expenses which are related to hazardous materials or substances in the Project, including removal, disposal or cleanup or environmental liability, the OWNER shall indemnify, save harmless and defend CESI from and against all claims, damages, losses or expenses, including attorney's fees, arising out of or resulting from the performance of CESI's services, or claims against CESI arising from work of others or claims arising out of or related to the presence of hazardous materials or substances in the Project.

LIMIT OF LIABILITY: To the fullest extent permitted by law, the OWNER agrees to limit CESI's liability to the OWNER and to all construction contractors or subcontractors on the project for any and all injuries, claims, losses, expenses or damages whatsoever arising out of or in any way related to the Project or this Agreement from any cause or causes including but not limited to CESI's negligent acts, errors, omissions, strict liability, breach of contract, or breach of warranty, such that the total aggregate liability of CESI to all those named shall not exceed the total fee for CESI's services rendered in the project. Under no circumstances shall CESI be liable to the OWNER for any consequential damages, including but not limited to loss of use or rental, loss of profit or cost of any financing, however caused, including CESI's fault or negligence.

COMPLIANCE WITH LAW: CESI shall comply with all applicable provisions of Federal, State and local laws or regulations relating to employment.

SEVERABILITY: If, for any reason, any one or more of the provisions contained in this Agreement are held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision herein, and this Agreement shall be construed as if such invalid, illegal or unenforceable provision had not been contained herein.

DEFENSE OF CLAIMS: In the event of a public hearing or arbitration or any other proceeding, formal or informal, relating in any way to the Project, OWNER agrees to compensate CESI for all costs incurred or related to such proceeding, including but not limited to that necessary for preparation, responding to requests by any party, appearance at depositions or trial, or any other matter involving any such hearing or proceeding. Compensation shall be based upon hourly rates mutually agreed to by the parties or, in the absence of agreed-to rates, then the pay provisions under MODIFICATIONS hereinabove shall apply. This provision does not apply to proceedings to which CESI is a party nor to cases where such services are part of the agreed scope of services.

Phyllis Thomas - TWDB Grant Application 00003199

From: Heather Saul <HSaul@rgmiller.com>
To: "david.carter@twdb.state.tx.us" <david.carter@twdb.state.tx.us>
Date: 2/2/2011 3:33 PM
Subject: TWDB Grant Application 00003199

Good afternoon David;

We received a copy of your letter addressed to Mark Vogler in regards to Fort Bend County's Flood Protection Grant Application. We were needing a little clarification from you in regards to V. RESOLUTION. You are asking us to provide a signed resolution from Fort Bend County Drainage District, is that necessary considering that Fort Bend County Drainage District is controlled by a Board of Directors that is comprised of the Fort Bend County Commissioners Court. What we've been told by the Drainage District is that since the Commissioners Court passed the resolution, they (the Drainage District) are bound by the same resolution.

So, the question is, do we need to have another resolution passed by Commissioners Court?

Thanks for your assistance in this matter. We will forward all other requested information shortly.

Heather Saul
Marketing Assistant
R. G. Miller Engineers, Inc.