

*1. Administrative Details*

**Proposal Name: Chocolate Bayou, Texas Feasibility Study**

**by Agency: Brazoria County Drainage District #5 (BCDD5)**

**Locations: TX**

**Date Submitted: 08/20/2018**

**Confirmation Number: c1e3c256-8e72-4584-8bf0-8b82138526fe**

*Supporting Documents*

<b>File Name</b>	<b>Date Uploaded</b>
BCDD5 Statement of Support Letter.pdf	08/20/2018
Exhibit 1-4.pdf	08/20/2018
Tab 6-3.pdf	08/20/2018
Tab 6-5.pdf	08/20/2018

**2. Provide the name of the primary sponsor and all non-Federal interests that have contributed or are expected to contribute toward the non-Federal share of the proposed feasibility study or modification.**

Sponsor	Letter of Support
Lee Walden, P.E.(Primary)	<p>Colonel Lars N. Zetterstrom District Engineer and Commanding Officer U.S. Army Corps of Engineers, Galveston District P.O. Box 1229 Galveston, Texas 77553-1229 Re: Chocolate Bayou, Texas Feasibility Study via the Bipartisan Budget Act 2018 Dear Colonel Zetterstrom: This letter is to express Brazoria County Drainage District #5's interest in partnering with the U.S. Army Corps of Engineers' Galveston District as the non-Federal sponsor to conduct a feasibility study to assess flood risk mitigation alternatives along Chocolate Bayou under section 7001 of WRRDA 2014. Brazoria County Drainage District #5 is actively seeking opportunities to reduce recurring flood damages that occur from overflow of Chocolate Bayou, including, most recently, an extreme flood event associated from rainfall from Hurricane Harvey. We are interested in opportunities to reduce the frequency of flood events, reduce damages to private and public property that occurs during floods, and reduce the threat to life safety. Due to the possible magnitude of the project, a Feasibility Study is being requested under the Bipartisan Budget Act of 2018. Brazoria County Drainage District #5 believes that the funding provided by the Bipartisan Budget Act of 2018 (Act) presents a unique opportunity to identify and implement a Federal project on Chocolate Bayou that is technically feasible, economically justified, and environmentally acceptable. Under the Act provisions, we understand that this study would be completed at full Federal expense, and that an identified project would be eligible for Construction funds provided by the Act. Brazoria County Drainage District #5 is committed to working closely with the Galveston District and Vertical Team to complete the study in three years or less under the Corps' SMART Planning Policy. Respectfully, Lee N. Walden, P.E. President of the Board</p>

**3. State if this proposal is for a feasibility study, a modification to an authorized USACE feasibility study or a modification to an authorized USACE project. If it is a proposal for a modification, provide the authorized water resources development feasibility study or project name.**

[x] Feasibility Study

***4. Clearly articulate the specific project purpose(s) of the proposed study or modification. Demonstrate that the proposal is related to USACE mission and authorities and specifically address why additional or new authorization is needed.***

The Chocolate Bayou Watershed (CBW) lies almost entirely in Brazoria County, Texas. The county and the Chocolate Bayou Watershed (CBW) are characteristically flat, with low lying topography, meandering natural channels, rather straight man-made canals, and sometimes ill-defined watershed boundaries. These features, coupled with historically severe rainfall events (e.g., the City of Alvin has the highest recorded 24-hour rainfall in United States history, some 43 inches (Texas Almanac, 2008-09), are highly conducive to drainage problems and significant and frequent flooding throughout the county, including the CBW. Indeed, major portions of the CBW lie in the Federal Emergency Management Agency (FEMA) designated 100-year floodplains. Many of these flooding losses have occurred in the cities of the CBW. Manvel, which lies at the heart of the largest floodplain area in the watershed, has suffered more than 200 loss incidents since 1978. The communities of Manvel, Iowa Colony and Liverpool have had, collectively, nearly 300 reported loss incidents since 1978 [FEMA, 2007]. The City of Alvin, which has recently expanded its boundaries into and across the Chocolate Bayou watershed in response to residential land development, may experience significant damage from Chocolate Bayou flooding in the future if effective control measures are not instituted. Objectives for this Study are identification, description, assessment, and recommendation of potential flood control options that will address flooding problems in the CBW, with a particular focus directed toward reduction in residential structure flooding-induced damages. The motivation of this Study is in full accord with the Mission Statement of the USACE which includes, but is not limited to, the reduction of risks from disasters. Authorization is needed because of the potential magnitude of this project, which would far exceed the ability of Brazoria County Drainage District #5 (BCDD5) to fund.

5. To the extent practicable, provide an estimate of the total cost, and the Federal and non-Federal share of those costs, of the proposed study and, separately, an estimate of the cost of construction or modification.

	Federal	Non-Federal	Total
Study	\$1,500,000	\$1,500,000	\$3,000,000
Construction	\$35,500,000	\$0	\$35,500,000

Explanation (if necessary)

***6. To the extent practicable, describe the anticipated monetary and nonmonetary benefits of the proposal including benefits to the protection of human life and property; improvement to transportation; the national economy; the environment; or the national security interests of the United States.***

Benefits resulting from reduction of flood damages include an increase in property revenue because of increased property value, improved transportation and emergency access, improved stream water quality, and greater community value. Table 6-3 (attached as an “Additional Doc”) lists the computed expected annual average flood damage reduction benefits for conveyance projects, diversion pond projects, and combined conveyance and diversion pond projects for the various sub-watersheds. For a particular sub-watershed, the benefits include not only the benefits occurring from reducing flooding in the sub-watershed but reduced flooding in other sub-watersheds due to downstream flow reductions and consequent tailwater reductions when they are expected to occur. Table 6-3 also lists the estimated expected annual average flood damage reduction benefits for the siphon improvement projects in the Manvel area. Project benefits are broken down by the five individual siphon systems (East Fork Tributaries A and B, West Fork Tributaries A and B, and Ditch C-1 2) that compose the full set of siphon improvements. Table 6-3 also lists the expected annual average flood damage reduction benefits from the three Brunner Ditch Options (Options A, B, and C); no difference in the benefits obtain when in-line detention vs. off-line detention ponds are used to mitigate the impacts of flow increases. Flood control projects will also yield a reduction in flooded lands, irrespective of whether structural flooding is reduced. Table 6-5 (attached as an “Additional Doc”) lists for the conveyance improvement projects, the diversion pond projects, and the combined conveyance improvements and diversion projects the reduction in the 100-yr floodplain lands that the various potential projects would produce.

**7. Does local support exist? If 'Yes', describe the local support for the proposal.**

Yes

### **Local Support Description**

The following regional entities have expressed their support of the aim of this project to benefit the local residents by reducing flooding from Chocolate Bayou: Brazoria County, City of Alvin, Iowa County, City of Manvel, Brazoria County Drainage District No. 4 (BCDD4), Brazoria County Conservation & Reclamation District No. 3, and Texas Water Development Board (TWDB).

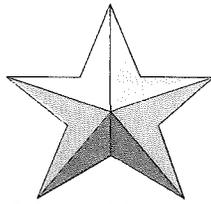
**8. Does the primary sponsor named in (2.) above have the financial ability to provide for the required cost share?**

Yes

# Primary Sponsor Letter of Support

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**BCDD5 Statement of Support Letter.pdf**



LNR 30 MAY 18  
↳ PPM

BRAZORIA COUNTY DRAINAGE DISTRICT # 5  
P.O. BOX 1 \* ROSHARON, TX \* 77583 \* PHONE (281) 369-0071 \* FAX (281) 595-3199  
LEE WALDEN, P.E. - PRESIDENT \* KERRY L. OSBURN – VICE PRESIDENT  
MARK ROLLER – SECRETARY/ TREASURER

May 22, 2018

Colonel Lars N. Zetterstrom  
District Engineer and Commanding Officer  
U. S. Army Corps of Engineers, Galveston District P. O. Box 1229  
Galveston, Texas 77553-1229

Re: Chocolate Bayou, Texas Feasibility Study via the Bipartisan Budget Act 2018.

Dear Colonel Zetterstrom:

This letter is to express Brazoria County Drainage District #5's interest in partnering with the U.S. Army Corps of Engineers', Galveston District as the non-Federal sponsor to conduct a feasibility study to assess flood risk mitigation alternatives along Chocolate Bayou under section 7001 of WRRDA 2014.

Brazoria County Drainage District #5 is actively seeking opportunities to reduce recurring flood damages that occur from overflow of Chocolate Bayou, including, most recently, an extreme flood event associated from rainfall from Hurricane Harvey. We are interested in opportunities to reduce the frequency of flood events, reduce damages to private and public property that occurs during floods, and reduce the threat to life safety. Due to the possible magnitude of the project, a Feasibility Study is being requested under the Bipartisan Budget Act of 2018. Brazoria County Drainage District #5 believes that the funding provided by the Bipartisan Budget Act of 2018 (Act) presents a unique opportunity to identify and implement a Federal project on Chocolate Bayou that is technically feasible, economically justified, and environmentally acceptable.

Under the Act provisions, we understand that this study would be completed at full Federal expense, and that an identified project would be eligible for Construction funds provided by the Act. Brazoria County Drainage District #5 is committed to working closely with the Galveston District and Vertical Team to complete the study in three years or less under the Corps' SMART Planning Policy.

We are excited about the current opportunity to reduce flood risk in the historically underserved Chocolate Bayou. Please let us know the next steps to launch this study.

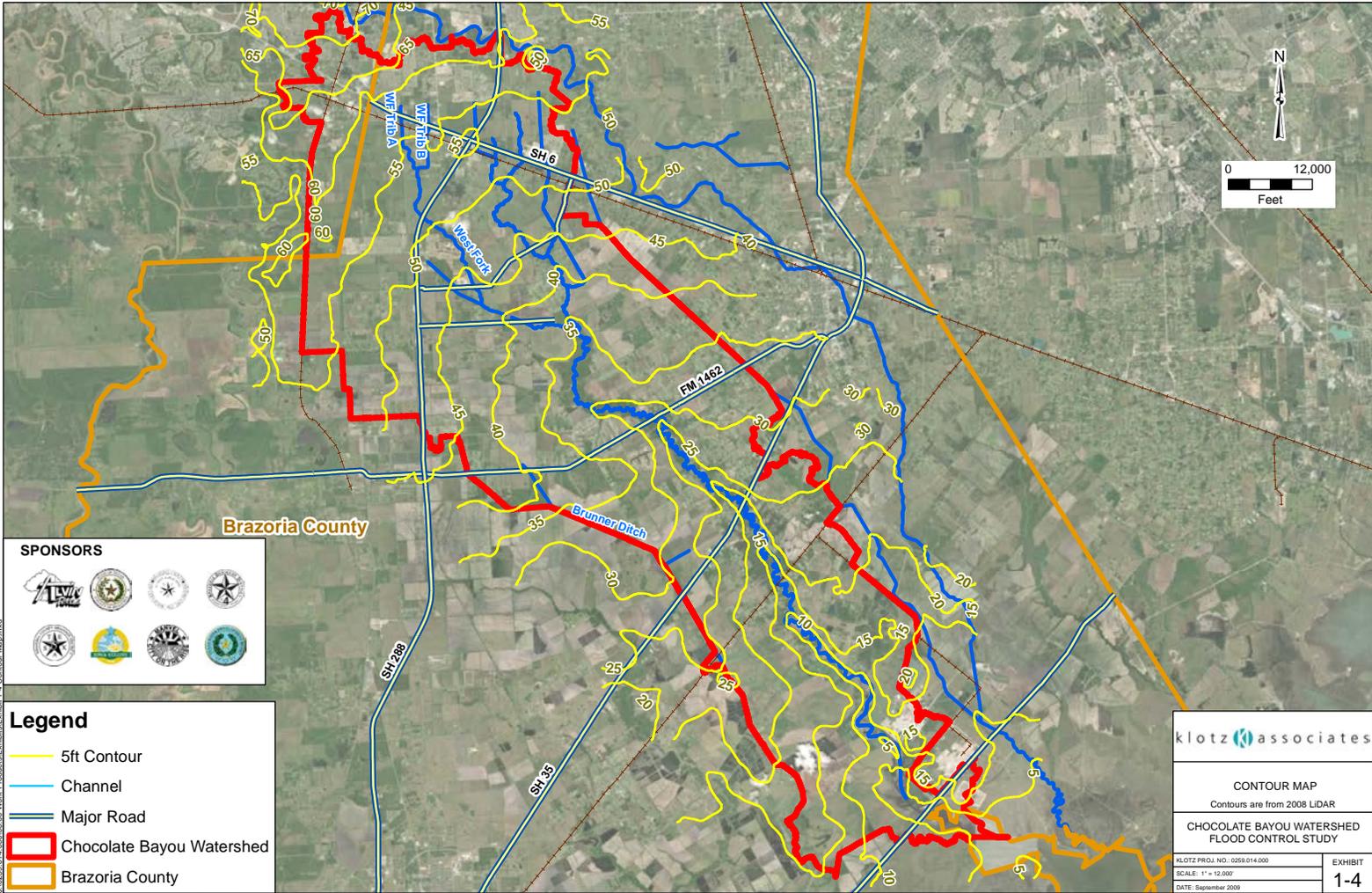
Respectfully,

  
\_\_\_\_\_  
LEE N. WALDEN, P.E.  
PRESIDENT OF THE BOARD

# Map Document

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**Exhibit 1-4.pdf**



**SPONSORS**



**Legend**

- 5ft Contour
- Channel
- Major Road
- Chocolate Bayou Watershed
- Brazoria County

klotz associates

**CONTOUR MAP**  
Contours are from 2008 LIDAR

**CHOCOLATE BAYOU WATERSHED  
FLOOD CONTROL STUDY**

KLOTZ PROJ. NO.: 0259.014.000	EXHIBIT
SCALE: 1" = 12,000'	1-4
DATE: September 2009	

10/20/09 04:40:02 PM \\srs\products\Exhibit\Exhibit 1-4 Contour Map.mxd

# Additional Proposal Information

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**Tab 6-3.pdf**

**Table 6-3 Expected Annual Average Flood Reduction Benefits**

Revised Diversion Pond Benefit Figures based on Watershed wide Benefits Calculated for West Fork

	Chocolate			Ditch C12			North Hayes			South Hayes			West Fork		
	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target
5yr Pond Design	\$2,212,290	-	-	\$405,343	-	-	\$87,792	-	-	\$118,769	-	-	\$193,172	-	-
10yr Pond Design	\$3,330,446	\$434,832	-	\$680,321	\$64,191	-	\$131,076	\$26,023	-	\$169,269	\$22,152	-	\$253,006	\$49,351	-
25yr Pond Design	\$4,143,280	\$775,630	\$165,845	\$872,946	\$151,173	\$42,195	\$155,865	\$45,906	\$13,374	\$196,802	\$40,088	\$4,238	\$296,479	\$86,906	\$30,846
50yr Pond Design	\$4,442,028	\$930,795	\$276,607	\$978,733	\$238,483	\$99,877	\$169,389	\$56,825	\$19,150	\$213,851	\$50,281	\$10,363	\$312,397	\$103,184	\$33,172
100yr Pond Design	\$4,593,965	\$1,011,646	\$342,767	\$1,031,877	\$283,305	\$159,019	\$176,109	\$62,340	\$25,701	\$221,860	\$55,378	\$27,693	\$321,680	\$111,719	\$44,176

Conveyance Improvement Annual Average Benefit Summary

	Chocolate	Ditch C12	North Hayes	South Hayes	West Fork
2yr Channel Design	\$4,203,830	\$248,490	\$185,403	\$408,180	\$1,535,400
5yr Channel Design	\$4,225,061	\$251,097	\$194,758	\$428,610	\$1,568,339
10yr Channel Design	\$4,232,871	\$263,549	\$198,138	\$452,890	\$1,575,911
Average	\$4,220,587	\$254,379	\$192,766	\$429,893	\$1,559,883

Expected Annual Average benefits for Combined Conveyance and Diversion Ponds

	Chocolate			Ditch C12			North Hayes			South Hayes			West Fork		
	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target	2yr Target	5yr Target	10yr Target
5yr Pond Design	\$5,211,998	-	-	\$327,701	-	-	\$197,369	-	-	\$438,034	-	-	\$1,579,840	-	-
10yr Pond Design	\$5,942,194	\$4,303,133	-	\$426,297	\$256,908	-	\$202,551	\$193,202	-	\$445,582	\$430,210	-	\$1,592,260	\$1,561,405	-
25yr Pond Design	\$6,509,000	\$4,432,186	\$4,235,699	\$508,822	\$267,124	\$255,501	\$206,250	\$194,088	\$192,883	\$450,534	\$430,909	\$429,905	\$1,602,686	\$1,564,398	\$1,560,491
50yr Pond Design	\$6,722,969	\$4,501,502	\$4,258,487	\$557,752	\$283,526	\$260,256	\$208,475	\$194,766	\$193,004	\$453,872	\$431,471	\$429,964	\$1,606,772	\$1,566,133	\$1,560,585
100yr Pond Design	\$6,832,799	\$4,539,641	\$4,275,645	\$583,172	\$293,906	\$268,369	\$209,633	\$195,157	\$193,191	\$455,509	\$431,795	\$430,385	\$1,609,218	\$1,567,141	\$1,561,110

Note:

1. These figures assume that all of the detention benefits within an individual sub-watershed are negated by the mitigation required by the conveyance improvements within the said sub-watershed. As such the total benefits for a combined conveyance detention project is equal to the conveyance benefits calculated for each sub-watershed plus the detention benefits calculated for each sub-watershed on a watershed wide basis minus the detention benefits calculated for each sub-watershed on an individual sub-watershed basis.

# Additional Proposal Information

(This is as uploaded, a blank page will show if nothing was submitted)

**Tab 6-5.pdf**

Table 6-5 Reduction in 100-yr Storm Flooded Land

Channel	Existing Area (ac)	Conveyance Improvements		
		2-YR Target	5-YR Target	10-YR Target
		Area (ac)	Area (ac)	Area (ac)
Chocolate Bayou	10930	3609	3772	3815
Ditch C-12	2603	545	589	756
North Hayes	3010	1266	1794	2083
South Hayes	4872	1454	1724	2191
West Fork	7527	4135	4374	4444

Channel	Existing Area (ac)	Diversion Ponds											
		2-YR Target					5-YR Target				10-YR Target		
		5yr Pond Area (ac)	10yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)	10yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)
Chocolate Bayou	10930	791	1495	2390	3226	4020	604	1320	2130	2939	530	1272	2192
Ditch C-12	2603	5	48	105	754	1404	4	23	250	477	4	27	232
North Hayes	3010	30	104	367	939	2593	55	122	727	1331	57	157	827
South Hayes	4872	93	191	515	1167	2887	111	252	939	1627	109	263	1037
West Fork	7527	372	589	877	1517	2158	332	456	906	1356	310	188	803

Channel	Existing Area (ac)	Combinations Conveyance Improvements & Diversion Ponds											
		2-yr Target					5-yr Target				10-yr Target		
		5yr Pond Area (ac)	10yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)	10yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)	25yr Pond Area (ac)	50yr Pond Area (ac)	100yr Pond Area (ac)
Chocolate Bayou	10930	4475	5102	5588	5772	5866	3842	3957	4019	4053	3818	3839	3854
Ditch C-12	2603	719	935	1116	1224	1279	602	626	665	689	733	747	770
North Hayes	3010	1348	1383	1408	1423	1431	1780	1788	1794	1798	2028	2029	2031
South Hayes	4872	1560	1587	1605	1617	1623	1730	1733	1735	1736	2080	2080	2082
West Fork	7527	4255	4288	4316	4327	4334	4355	4363	4368	4371	4401	4401	4403