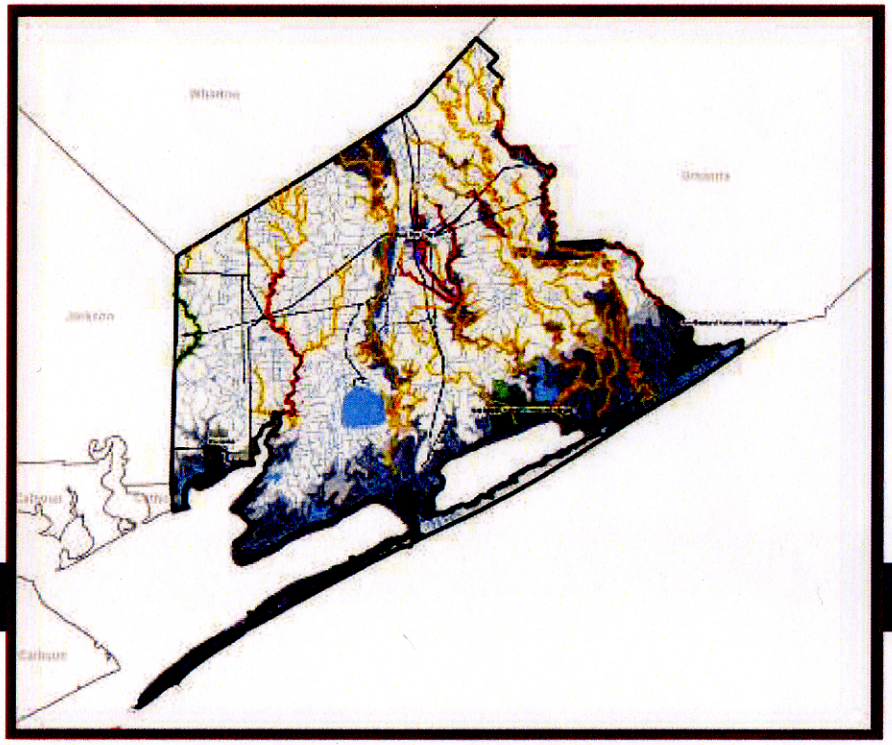
MATAGORDA COUNTY

FLOOD MITIGATION PLAN

MATAGORDA COUNTY
CITY OF BAY CITY
CITY OF PALACIOS

Prepared by:

Matagorda County Flood Mitigation Planning Committee



HALFF ASSOCIATES, INC.
January 2010

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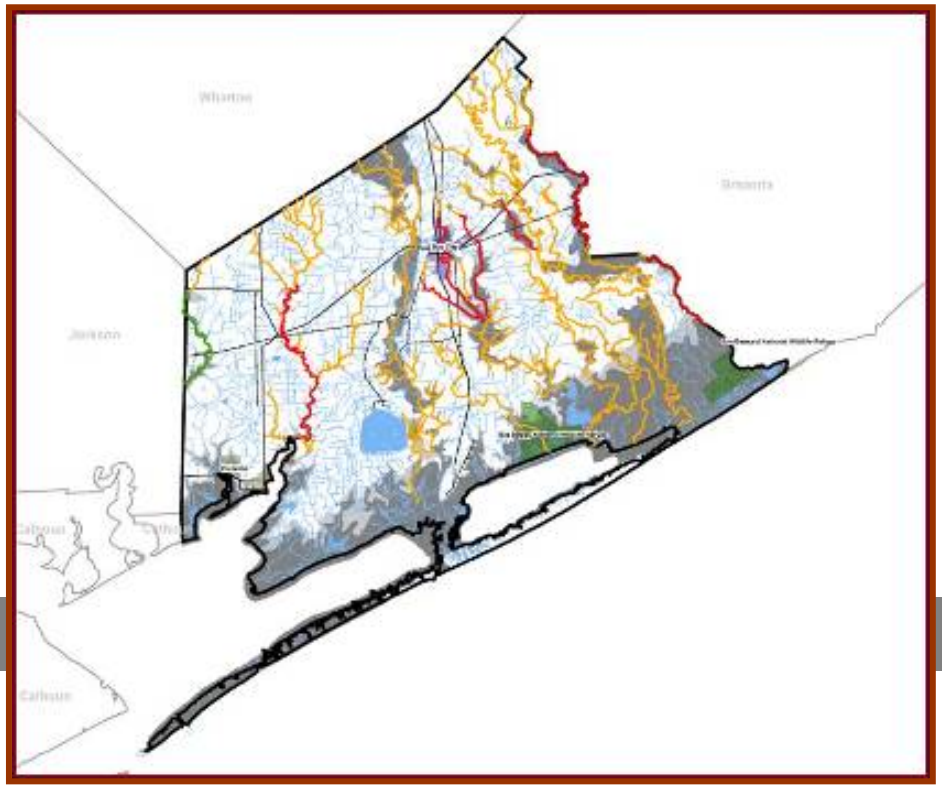

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EXECUTIVE SUMMARY

Utilizing Flood Mitigation Assistance Program (FMA) funding from the Texas Water Development Board (TWDB), Matagorda County committed to developing a Flood Mitigation Plan to address flooding concerns within the community. The County selected Halff Associates, Inc., as a planning consultant to assist in the preparation of the Flood Mitigation Plan.

Matagorda County is vulnerable to several natural and technological hazards that have been addressed in the Texas Colorado River Floodplain Coalition's (TCRFC) "all hazards" Mitigation Plan prepared with Hazard Mitigation Grant Program (HMGP) funding administered by the Texas Division of Emergency Management (TDEM). The Matagorda County All Hazards Plan was prepared to meet the requirements of the Disaster Mitigation Act of 2000 and to qualify Matagorda County and all participating communities that include the cities of Bay City and Palacios, for future Hazard Mitigation Grant Program (HMGP) funding. In order to address the specific flood hazards faced, Matagorda County has also developed a Flood Mitigation Plan to satisfy the requirements of both the Flood Mitigation Assistance Program as administered through the TWDB and the Community Rating System (CRS) program as administered through the Federal Emergency Management Agency (FEMA).

Mitigation is characterized as a long-term, ongoing process. This plan seeks to address all flood hazards within Matagorda County. It provides general guidance related to various flood hazards within the county and an overview of numerous mitigation efforts undertaken by Matagorda County, the TCRFC and the various communities in Matagorda County. In addition, the plan identifies potential problematic conditions and outlines corrective actions that the County will undertake to remedy identified problems. Planning and implementation actions will be identified that are applicable to both pre-disaster and post disaster situations.

A Flood Mitigation Plan is more than just another planning document. It is a dynamic record of the county's recognition of its vulnerability to flood hazards, determination of the risks associated with flood effects, and commitment to reducing the long-term consequence of flooding. The Flood Mitigation Plan outlines the mitigation goals within the county, identifies risk reduction strategies for hazards that threaten the area, and discusses the ongoing risk reduction activities accomplished within each jurisdiction.

The Matagorda County Flood Mitigation Plan was developed by following the ten (10) step planning process outlined in the FEMA CRS Coordinators Manual as Floodplain Management Planning Criteria; the process was further expanded to include FMA planning requirements. TWDB and FEMA approval of the Matagorda County Flood Mitigation Plan qualifies Matagorda County and participating communities within the county to receive federal funding through the FMA program for acquisition, relocation, and/or elevation of flood-damaged properties.

Matagorda County participates in the National Flood Insurance Program (NFIP), which allows flood insurance to be available throughout the unincorporated areas of the county. As a product of the Flood Mitigation Plan, Matagorda County has evaluated FEMA's CRS Program. Classification as a CRS Community recognizes the Matagorda County and other participating

community's Floodplain Management Program as exceeding the basic requirements for participation in the NFIP. Each community that enters FEMA's CRS Program will receive reduced flood insurance premiums within the community as follows:

> CRS Class 9 - All flood insurance policies within the participating community receive a minimum of 5% reduction in annual premiums.
>
> CRS Class 8 or lower - All flood insurance policies for properties located within the designated Special Flood Hazard Area (Zones A1-A30, AE, A, AO, AH, V1-30, VE, and V) will receive an additional 5% reduction in annual premiums for each rating classification better than CRS 9.

A Flood Mitigation Planning Committee was formed consisting of Matagorda County employees, local citizens, and property owners. To assist in the planning effort Matagorda County selected Halff Associates, Inc. to act as the planning consultant and coordinate with the Texas Water Development Board and "other agencies" during the preparation of the Plan. The Matagorda County Flood Mitigation Planning Committee members are as follows:

Lisa Krobot	Matagorda County Floodplain Manager
Doug Matthes	Matagorda Co. Emergency Management
Ruben Gonzales	Matagorda Co. Environmental Health
Jim Hendricksen	City of Bay City Floodplain Manager
Don Guynes	City of Palacios Floodplain Manager
Haskell Simon	Matagorda County Resident
Roy Sedwick	LCRA Floodplain Coordinator (retired)
Heidi Carlin	LCRA and TCRFC Representative
Monica Martin	TCRFC Regional Director/Wharton County
Gilbert Ward	Texas Water Development Board
Mark Woolridge	TxDOT Area Engineer
Andy Brzozowski	TxDOT Supervisor
John Ivey	Halff Associates, Inc.
Wes Birdwell	Halff Associates, Inc.
Mickey Reynolds	Halff Associates, Inc.

The Flood Mitigation Planning Committee met from January to October 2009 to prepare the Matagorda County Flood Mitigation Plan. Each committee member provided input and guidance in plan development. A Flood Mitigation Plan questionnaire was prepared and published in local newspapers along with a public notice in an effort to increase public involvement regarding floodplain management planning. On December 14, 2009, a public notice was placed in the Bay City Tribune announcing a public meeting to discuss the Matagorda County Flood Mitigation Plan. The public meeting was held December 14, 2009 at the Matagorda County Courthouse, 1700 Seventh Street, Bay City, Texas.

During the planning process, copies of the draft plan were submitted to outside organizations and "Other Agencies" for comment. The organizations contacted included the following: FEMA, Houston-Galveston Area Council (HGAC), Insurance Services Office (ISO), Society of

American Military Engineers (SAME), LCRA, TCRFC, Texas Department of Transportation (TxDOT), TDEM, Texas General Land Office (GLO), Texas Parks and Wildlife Department (TPWD), Texas Water Development Board (TWDB), U.S. Army Corps of Engineers (USACE) – Fort Worth and Galveston District Offices, Brazoria County, Colorado County, Jackson County, Wharton County, City of Bay City, and City of Palacios. Of the agencies and communities contacted, comments on the plan were received from:

Texas Commission on Environmental Quality
Texas Parks and Wildlife Department
Houston-Galveston Area Council
Texas Division of Emergency Management
Lower Colorado River Authority
Texas Colorado River Floodplain Coalition

Throughout the plan development process, the Committee reviewed the TCRFC "All Hazards" Mitigation Plan that identified numerous hazards that Matagorda County may encounter. Although flooding remains the primary concern and focus of the plan, each hazard was briefly discussed within the planning document. To clarify the extent to which the community is subject to flood events, the plan identifies the following: number and types of buildings located within the floodplain, the number of flood insurance policies held within the community, and the number of flood losses and repetitive loss properties within Matagorda County. The procedures for warning and evacuation during emergency events are also included in the plan. Critical facilities located within the community and their proximity to the floodplain in discussed. Finally, specific mitigation projects already completed within the county are recognized.

After assessing the hazards and reviewing potential alternatives, the Flood Mitigation Planning Committee established flood mitigation goals for Matagorda County. Current mitigation activities, CRS Program activities, and other Public Works, Parks Department and Emergency Management activities completed on an annual basis were identified. Documentation of each of the activities was included in the plan to receive appropriate CRS planning credits. Following identification of goals and activities, the Committee recommended mitigation actions to be undertaken or continued as part of the flood mitigation planning effort.

INTRODUCTION

The Matagorda County Flood Mitigation Plan is a cooperative effort between Matagorda County, the cities of Bay City and Palacios, the Texas Water Development Board (TWDB), Lower Colorado River Authority (LCRA), the Texas Colorado River Floodplain Coalition (TCRFC), the US Army Corps of Engineers (USACE), the Federal Emergency Management Agency (FEMA) and others. Matagorda County is bisected by the Colorado River with Linnville Bayou and Cedar Lake Creek as its eastern boundary and 43.1 miles fronting on Matagorda Bay and Matagorda Peninsula, the natural barrier island fronting on the Gulf of Mexico. Matagorda County is bordered by Brazoria County to the east, Wharton County to the north and Jackson County and Calhoun County to the west. State Highway 35 bisects Matagorda County from east to west. Figure 1, Matagorda County Planning Area, locates the incorporated areas within the County and identifies rivers, streams and waterways.

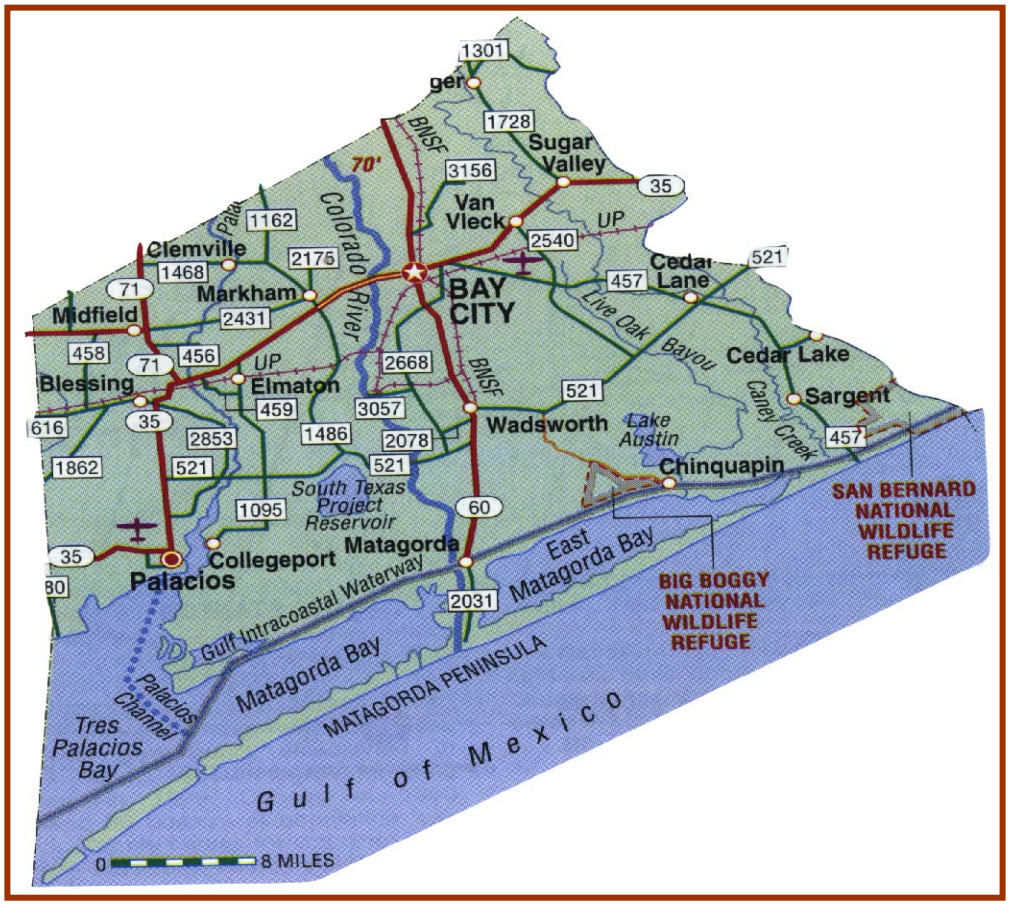

Figure 1: Matagorda County Planning Area

Based on the Texas Almanac, 2008-2009 Edition, Matagorda County has a current population of 37,824. The Houston Metropolitan Statistical Area has an estimated population of 5,539,949. This area includes Brazoria County, which is adjacent to the planning area to the east. The growth rate in the Houston Metropolitan Area is one of the fastest in the nation. Such rapid growth places enormous pressure on Matagorda County and areas along the Gulf of Mexico.

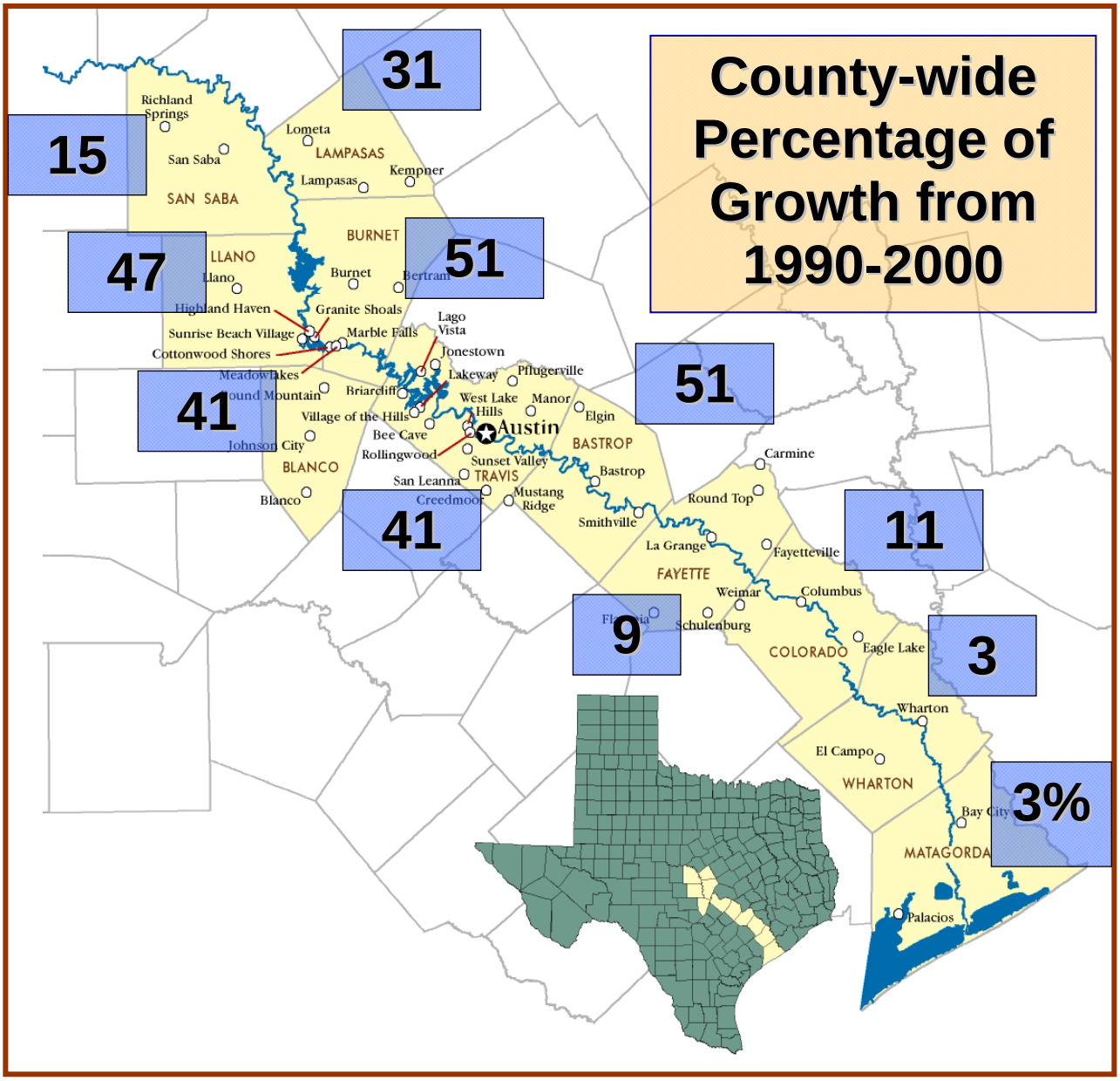

Figure 2 : Population Growth 1990 - 2000

Table 1: Population Trends Along SH-35, US-59 and IH-69 Corridor

County	Population 1990	Population 2000	Increase	% Increase
Harris County (total)	2,818,199	3,400,578	582,379	20.66%
Fort Bend County (total)	225,421	354,452	129,031	57.24%
Wharton County (total)	41,184	41,475	291	0.70%
Matagorda County (total)	39,955	41,188	1,233	3.09%
Jackson County (total)	13,039	14,391	1,352	10.37%
Brazoria County (total)	232,909	287,898	54,989	19.10%
Victoria County (total)	74,361	84,088	9,727	13.08%
Total 6 Counties	**3,445,068**	**4,224,070**	**779,002**	**22.61%**

Note: County Population includes all incorporated communities.
Data Source: U.S. Census Bureau

Race/ethnicity breakdowns for Matagorda County as compared to the State of Texas totals, per the 2008-2009 Texas Almanac, are as follows:

Ethnicity	Matagorda County	Texas
Anglo	53.00%	49.0%
Black	12.84%	11.0%
Hispanic	31.35%	36.0%
Other	2.81%	4.0%

Based on information available on the Texas Department of Economic Development website, www.txed.state.tx.us and the Texas Almanac 2008/2009 the unemployment rate for Matagorda County is as follows:

Matagorda County 6.1% unemployment

Based on information provided by community representatives on the Matagorda County Mitigation Planning Committee and research of state and federal agency websites, there are no State or Federal designations related to minority or economically disadvantaged populations in Matagorda County or any community within Matagorda County. The Matagorda County minority populations are slightly lower than the Texas state average. The primary economy drivers in Matagorda County are related to the South Texas Nuclear Power Plant, petrochemicals and agribusiness.

Matagorda County elevations range from Sea Level to 150 feet. In addition to coastal storms, the area is vulnerable to several natural and technological hazards. In order to address the hazards faced, Matagorda County in cooperation with the Texas Colorado River Floodplain Coalition prepared the TCRFC "All Hazards" Mitigation Plan. Matagorda County has also prepared an Emergency Management Plan composed of a basic plan and functional annexes to support the

basic plan. The assignments of responsibility for content and update to the functional annexes are as follows:

Annex	Title	Responsibility
A	Warning	Emergency Management Coordinator
B	Communications	Emergency Management Coordinator
C	Shelter	Emergency Management Coordinator
D	Radiological	Fire Marshall
E	Evacuation	Emergency Management Coordinator
F	Fire and Rescue	Fire Marshall
G	Law Enforcement	County Sheriff
H	Health and Medical	Health Director
I	Emergency Public Information	Emergency Management Coordinator
J	Damage Assessment	Emergency Management Coordinator
K	Public Works / Engineering	County Commissioners
L	Utilities	County Commissioners
M	Resource Management	Emergency Management Coordinator
N	EOC Direction and Control	Emergency Management Coordinator
O	Human Services	Emergency Management Coordinator
P	Hazard Mitigation	Emergency Management Coordinator
Q	Hazardous Materials	Fire Marshall
R	Search and Rescue	County Sheriff
S	Transportation	Emergency Management Coordinator
T	Donations Management	Emergency Management Coordinator
U	Legal	County Attorney
V	Terrorism	County Sheriff

The Matagorda County Flood Mitigation Plan is a "stand alone" plan but draws from and references many of the annexes found in both the Matagorda County *Emergency Management Plan and the TCRFC "All Hazards" Mitigation Plan.*.

The most frequent disaster events that have impacted the Texas Gulf Coast Area are widespread hurricane and flooding events resulting from tropical storms. Within the last seventeen (17) years, Matagorda County has experienced numerous flood events including six (6) Presidential Disaster Declarations:

December 26, 1991	FEMA 930-DR
March 15, 1993	City of Palacios Flooding
October 18, 1994	FEMA 1041-DR East Texas Flood
December 17, 1995	Bay City Flooding
September 21, 1996	County-wide Flooding
October 24, 1996	County-wide Flooding
May 9, 1997	County-wide Flooding
October 21, 1998	FEMA 1257 – DR (43 Texas counties)
November 12 – 15, 1998	County-wide Flooding
August 30 – September 1, 2001	County-wide Flooding

September 6 – 10, 2002	Sargent and Bay City Flooding
September 26, 2002	FEMA 1434 – DR Tropical Storm Fay
July 15, 2003	FEMA-1479 –DR Hurricane Claudette
November 21 – 22, 2004	County-wide Flooding
July 8, 2006	County-wide Flooding
September 13, 2008	FEMA 1791 – Hurricane Ike

The National Climatic Data Center recorded 24 flood events in Matagorda County from October 18, 1994 to September 30, 2006 with $2.595M in property damages and $50,000 in crop damage. (Source: www.ncdc.noaa.gov)

Figure 3: Lower Colorado River Flooding October 1998

In addition to flooding from coastal storms, natural hazards such as severe weather, extreme temperature variations, and winter weather pose risk to Matagorda County. Matagorda County, home to the South Texas Nuclear Power Plant, is also located near the largest petrochemical centers and ports in the World. Therefore, hazardous conditions may develop from hazardous material accidents, transportation accidents, terrorism or civil disorder. Through proper identification of hazards faced and assessment of the capability of the county to respond to those hazards, Matagorda County plans to improve the overall disaster preparedness countywide. By

developing and implementing a Flood Mitigation Plan, in conjunction with emergency management planning, Matagorda County will achieve this goal.

PURPOSE

Mitigation is characterized as a long-term, on-going process. This plan seeks to address flood hazards within Matagorda County, including the cities of Bay City and Palacios. The plan provides general guidance related to flood hazards within Matagorda County and an overview of mitigation efforts undertaken by all communities in the County. In addition, the plan identifies potential problematic conditions and outlines corrective actions that the county will undertake to remedy the identified problems. Planning and implementation actions will be identified that are applicable to both pre-incident and post-incident situations.

The adverse impact of flood hazards can be directly affected by mitigation actions accomplished prior to the occurrence of an emergency situation. Effective post-event mitigation actions can also reduce the risk of repeat disasters. Therefore, mitigation planning and implementation activities are an on-going process and integral part of the comprehensive emergency management program.

Reference Documents for this plan include:

- Lower Colorado River Flood Damage Evaluation Project (2003)
- Lower Colorado River Basin Map Master Plan (2003)
- Matagorda County Flood Insurance Study dated May 4, 1992
- City of Bay City Flood Insurance Study dated June 5, 1985
- Cottonwood Creek Flood Protection Plan dated October 1990
- City of Palacios Flood Insurance Study dated February 5, 1986
- TCRFC All Hazards Mitigation Plan (2004 and 2009 update)
- Matagorda County FEMA Scoping Maps (April 12, 2006)
- Matagorda County Emergency Management Plan
- Matagorda County Flood Damage Prevention Ordinance
- City of Bay City Flood Damage Prevention Ordinance
- City of Palacios Flood Damage Prevention Ordinance
- FEMA/ National Flood Insurance Program (NFIP) Flood Insurance Policy and Claims Records
- National Weather Service Hurricane Ike Report (2009)
- National Weather Service Storm Evacuation Map for the Matagorda Co. Area
- Texas Division of Emergency Management (TDEM)/Texas A&M University Evacuation Study
- Coastal Hazards Atlas of Texas: A Tool for Hurricane Preparedness and Coastal Management, August 2003

COMMUNITY SPECIFIC INFORMATION

Geology

Matagorda County is located in Southeast Texas in an area described in the Physiographic Map of Texas as the "Gulf Coastal Plain". Elevation ranges from sea level to 150 feet above sea level in this region. The area is classified as Gulf Prairie with alluvial, black and sandy loam soils.

Description Of Matagorda County

Matagorda County is a large agribusiness center fronting on the Gulf of Mexico midway between Houston and Corpus Christi with an estimated population of 37,824 based on the 2008-2009 Texas Almanac. Matagorda County is home to the South Texas Nuclear Power Plant, several important Wildlife Refuges, a thriving seafood industry, and is ranked as a major rice-producing county with 24,000 irrigated acres.

Fishing and shrimp boats frequently crowd Tres Palacios Bay

A Birder's Paradise: Matagorda County Is National Hot Spot

Whether you seek inland songbirds, savannah sparrows or long-legged shorebirds, chances are you won't be disappointed when visiting Matagorda County.

Located on the Great Texas Coastal Birding Trail, Matagorda County is on the central flyway – one of four principal North American migratory bird routes. Bird enthusiasts flock to Matagorda County during the spring and fall migration seasons, specifically each December to spot any of hundreds of reported species during the Mad Island Christmas Bird Count.

Bay City was incorporated in 1894. The city was named for its location in a vast coastal prairie known since the early 1820s as Bay Prairie. Bay City is 25 miles from the Gulf of Mexico and the beach. Matagorda County Museum is located in Bay City and tells the story of early settlements, industry and cultural history of the county. Riverside Park on the Colorado River has 40 RV sites with full hookups, playground, jogging trail, picnic area, pavilions and a boat ramp. The Rio Colorado Golf course features 18-holes designed by Gary Player.

Palacios takes its name from the bay on which it is located. The bay honors Jose Felix Trespalacios, Mexican governor of the area when Stephen F. Austin established his colony. The town was first known as Trespalacios, but the name was shortened to Palacios in 1902. The historic Luther Hotel was built in 1905 to accommodate prospective land buyers flocking to Palacios. The hotel is still in operation.

Transportation

State Highway 35 bisects Matagorda County from west to east and connects coastal traffic from Corpus Christi to Houston. SH-35 parallels US Highway 59 (future Interstate 69) which is one of the fastest developing corridors in Texas.

The Houston William P. Hobby Airport and the George Bush Intercontinental Airport are located within one hundred (100) miles east of the center of Matagorda County.

Matagorda Channel to Port Lavaca reported 11,607 consolidated tonnage in 2005. Brazosport, a community of eight cities and home of a large deepwater port, lies 35 miles southeast of the center of Matagorda County. The Houston Ship Channel and the Port of Houston are directly connected to Matagorda County by the Gulf Intracoastal Waterway that parallels the southern boundary of Matagorda County with numerous direct access points to shipping traffic.

The Gulf Intracoastal Waterway is 12 feet deep, 125 feet wide and runs for 426 miles along the Texas coast. It is limited to tugboats, barge "trains" and pleasure and fishing craft. The best view of the waterway is from the Colorado River Locks, operated by the U.S. Army Corps of Engineers. These locks are the only ones in Texas and some of the busiest in the United States. They are located one mile west of Texas 2031 at the end of Matagorda St. The 2008/2009 Texas Almanac reports 69,517 tons transported on the Gulf Intracoastal Waterway in 2005.

Economic Profile

Matagorda County is one of the top rice producing counties in Texas with 24,000 acres of irrigated farmland. Matagorda, Wharton and Colorado counties provide a combined economic benefit estimated at more than $300 million per year. Oil, agribusiness, and a variety of manufacturing facilities are located throughout the County. The rapid expansion of the Houston metro area has extended through Fort Bend and Brazoria counties and has penetrated Matagorda County. The 2008/2009 Texas Almanac shows population growth from 2000 to 2008 along the SH-35/US-59/IH-69 Corridor extending from Harris County/Houston through Fort Bend and Brazoria counties to Matagorda County as:

Population Growth

County/City	2000 - 2008
Harris County	14.3%
Fort Bend County	39.1%
Brazoria County	19.1%

Climate

The climate of the area is sub-tropical. Mild winters and warm summer's best characterize the climate. The average summer temperature ranges from a high of 94°F to a low of 74°F. The average winter temperature ranges from a high of 62°F to a low of 42°F. The area receives an average number of two hundred ninety (290) days per year of sunshine. Average rainfall per year is forty-five (45) inches. Rainfall is abundant and evenly distributed throughout the year. Hurricane season, spanning from June to November, usually produces the heaviest rainfall events.

HISTORY OF FLOODING WITHIN MATAGORDA COUNTY

As described in the Matagorda County Flood Insurance Study (FIS) dated May 4, 1992 and separate flood insurance studies published for the cities of Bay City and Palacios, the area is subject to intense local thunderstorms of short duration, general storms extending over periods of several days, and torrential rainfall associated with hurricanes and other tropical disturbances. Flooding results from coastal storms and stream overflow from the Colorado River, Caney Creek, Tres Palacios Creek, Linnville Bayou and Cedar Lake Creek.

Devastating floods have occurred in Matagorda County in 1919, 1945, 1961 (Carla), 1970 (Celia) and 2008 (Ike). Prior to construction of dams and reservoirs on the Colorado River above Matagorda County historic flood protection levees were constructed from the Wharton County boundary downstream through Bay City. The US Army Corps of Engineers also constructed a ring levee constructed around the Town of Matagorda. FEMA now requires that these levee systems be certified as providing protection from the 1% (100-year) flood to be mapped as providing protection on Flood Insurance Rate Maps (FIRMs). Figure 4 Levees in Matagorda County shows 42.05 miles of levees on the 39-mile segment of the Colorado River through Bay City. Table 2, Colorado River Levee Freeboard Table, identifies river sections where the levee system will be overtopped during the 100-year (1%) and 500-year (0.2%) flood events.

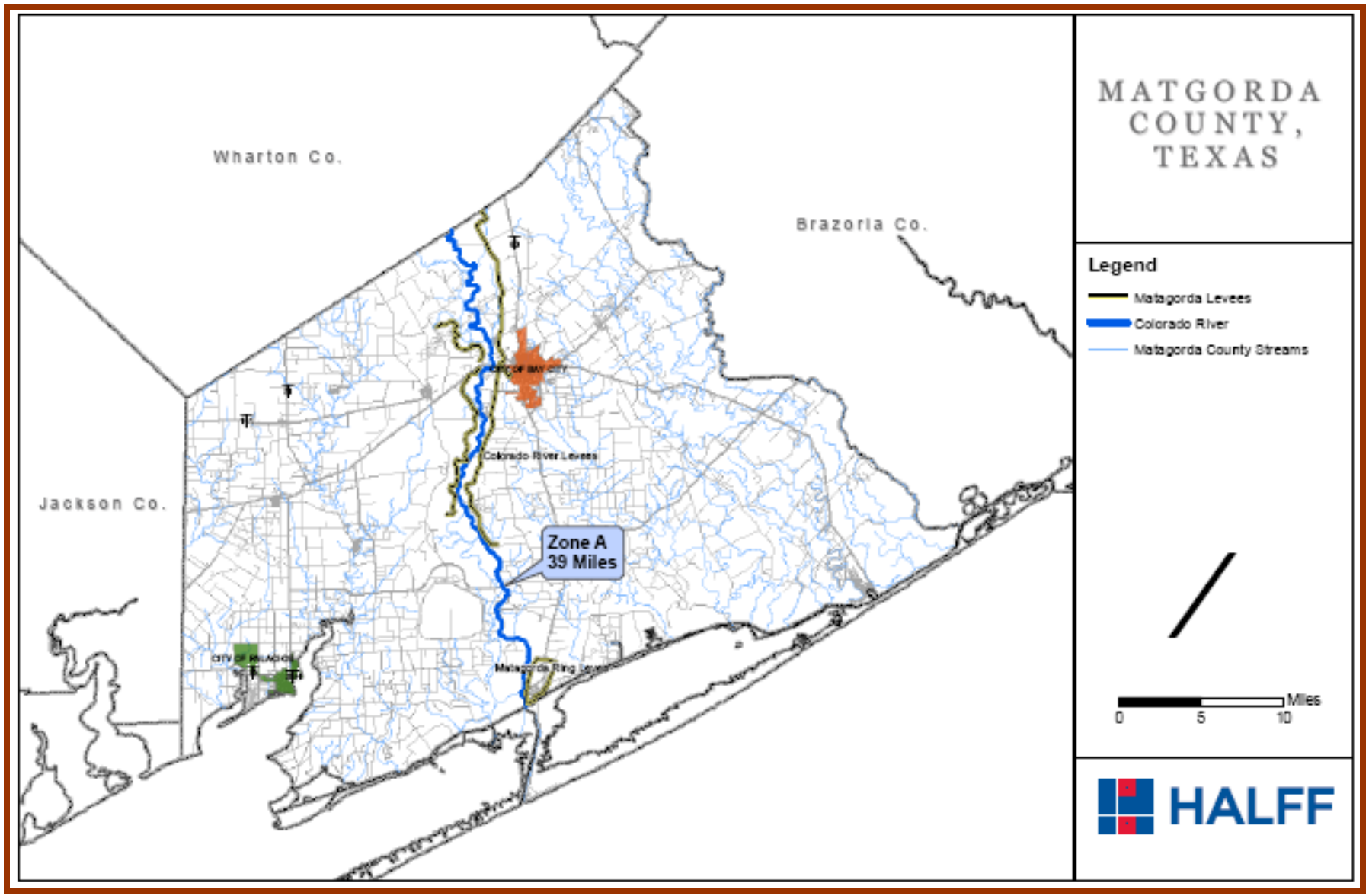

Figure 4: Levees in Matagorda County

Table 2: Colorado River Levee Freeboard Table

500 Left Freeboard	100 Left Freeboard	Left Levee	X-Sec Station	100-year WSEL	500-year WSEL	Right Levee	100 Right Freeboard	500 Right Freeboard
2.78	5.83	72.85	203436	67.02	70.07	72.37	5.35	2.30
3.01	5.98	72.02	197399	66.04	69.01	-	-	-
2.31	5.44	70.54	192311	65.10	68.23	-	-	-
4.07	7.24	71.58	187504	64.34	67.51	-	-	-
2.20	5.54	69.36	183508	63.82	67.16	-	-	-
0.69	4.27	67.46	179721	63.19	66.77	-	-	-
1.33	5.24	67.35	174772	62.11	66.02	-	-	-
0.32	4.42	66.02	173454	61.61	65.70	-	-	-
Overtopped	4.27	65.38	171520	61.11	65.41	-	-	-
Overtopped	3.30	63.75	170128	60.45	65.11	-	-	-
Overtopped	3.07	63.21	168695	60.14	64.84	-	-	-
Overtopped	4.28	63.77	167412	59.49	64.62	-	-	-
Overtopped	4.21	62.61	163414	58.41	64.21	-	-	-
Overtopped	3.18	60.77	161467	57.59	63.78	-	-	-
0.34	6.94	63.80	160002	56.86	63.46	63.59	6.73	0.13
0.43	7.00	63.42	156463	56.42	63.00	63.03	6.61	0.04
0.95	8.08	63.00	151612	54.92	62.05	64.52	9.60	2.47
2.11	9.38	63.43	149134	54.05	61.32	65.16	11.11	3.84
1.03	8.50	61.31	146818	52.81	60.28	60.58	7.77	0.30
3.15	10.84	62.71	145089	51.88	59.56	57.66	5.79	Overtopped
2.05	9.84	61.21	144005	51.37	59.16	58.20	6.83	Overtopped
0.32	8.36	59.09	142627	50.73	58.77	58.08	7.35	Overtopped
Overtopped	7.81	57.38	140575	49.57	58.38	54.17	4.60	Overtopped
1.11	10.23	58.92	139375	48.69	57.81	54.90	6.21	Overtopped
Overtopped	9.06	57.61	138594	48.55	57.61	57.23	8.68	Overtopped
Overtopped	8.34	57.13	138543	48.79	57.59	59.63	10.84	2.04
Overtopped	7.69	56.31	138295	48.63	57.21	59.42	10.80	2.21
Overtopped	7.76	56.29	138178	48.53	57.24	59.86	11.33	2.62
Overtopped	8.83	57.09	137599	48.26	57.18	61.72	13.46	4.54
Overtopped	8.28	55.53	135187	47.25	56.60	55.49	8.24	Overtopped
Overtopped	9.67	55.46	133375	45.80	55.83	55.51	9.72	Overtopped
Overtopped	9.77	55.31	133213	45.54	55.79	55.70	10.16	Overtopped
1.06	10.25	55.26	132570	45.01	54.21	50.21	5.20	Overtopped
Overtopped	8.93	53.27	128555	44.34	53.44	50.86	6.52	Overtopped
Overtopped	7.85	51.63	126238	43.78	53.03	50.03	6.25	Overtopped
Overtopped	9.63	52.83	124268	43.20	52.74	49.79	6.59	Overtopped
Overtopped	8.65	50.89	121321	42.24	52.02	50.00	7.76	Overtopped
Overtopped	5.46	47.28	119178	41.82	51.51	51.36	9.54	Overtopped
Overtopped	9.61	50.82	116474	41.22	50.92	46.56	5.35	Overtopped
Overtopped	9.20	49.17	113843	39.97	49.84	49.16	9.19	Overtopped
Overtopped	8.97	47.97	112074	39.00	48.70	46.34	7.34	Overtopped
Overtopped	8.59	46.99	108985	38.40	48.06	44.87	6.47	Overtopped
Overtopped	8.47	46.28	107083	37.81	47.54	44.48	6.67	Overtopped
Overtopped	8.65	45.16	104940	36.51	46.59	44.47	7.96	Overtopped
Overtopped	8.96	45.15	102895	36.19	46.00	41.62	5.43	Overtopped
Overtopped	9.15	44.72	101830	35.57	44.68	41.56	5.99	Overtopped
0.66	9.18	44.41	101119	35.23	43.75	42.57	7.34	Overtopped
0.76	9.88	45.59	101092	35.71	44.83	43.87	8.16	Overtopped
1.89	11.01	46.72	101017	35.71	44.83	46.63	10.92	1.80
0.15	8.35	43.58	100957	35.23	43.43	46.80	11.57	3.37

1.32	9.89	45.17	100311	35.28	43.86	46.52	11.24	2.67
0.14	8.67	43.91	99320	35.24	43.77	44.71	9.47	0.94
Overtopped	6.81	41.56	97047	34.75	43.02	43.35	8.60	0.33
Overtopped	8.17	42.51	94817	34.34	42.48	39.50	5.16	Overtopped
Overtopped	8.22	42.01	92887	33.79	41.92	39.23	5.44	Overtopped
Overtopped	7.43	40.82	90902	33.39	41.17	39.74	6.35	Overtopped
Overtopped	7.06	40.06	89046	33.00	40.66	37.55	4.55	Overtopped
Overtopped	7.56	40.15	87641	32.59	40.07	38.53	5.94	Overtopped
Overtopped	5.70	38.07	86133	32.37	39.61	37.55	5.18	Overtopped
9.19	16.11	48.39	84853	32.28	39.20	37.62	5.34	Overtopped
9.27	16.06	47.91	84183	31.85	38.64	38.06	6.21	Overtopped
3.39	9.48	40.58	80909	31.10	37.19	35.78	4.68	Overtopped
2.02	6.54	36.96	79734	30.42	34.94	36.32	5.90	1.38
1.25	6.46	36.65	78775	30.19	35.40	-	-	-
5.49	10.02	39.98	77264	29.96	34.49	-	-	-
1.18	4.05	33.24	75078	29.19	32.06	-	-	-
1.16	4.78	32.74	71904	27.96	31.58	-	-	-
0.72	4.21	31.38	69338	27.17	30.66	-	-	-
1.06	4.65	30.83	67523	26.18	29.78	-	-	-
Overtopped	2.33	28.51	65932	26.18	29.11	-	-	-
-	-	-	62550	25.29	27.53	-	-	-
-	-	-	60950	24.39	27.01	-	-	-
-	-	-	59278	24.13	26.61	-	-	-
-	-	-	56940	22.87	26.30	-	-	-
-	-	-	55204	22.71	26.13	-	-	-
-	-	-	53197	21.10	25.88	-	-	-
-	-	-	50967	20.77	25.56	-	-	-
-	-	-	50639	20.61	25.51	-	-	-
-	-	-	50539	20.49	25.48	-	-	-
-	-	-	50313	20.15	23.76	-	-	-
-	-	-	50109	20.31	23.73	-	-	-
-	-	-	47995	19.93	23.31	-	-	-
-	-	-	44969	19.57	22.92	-	-	-
-	-	-	43665	19.02	22.50	-	-	-
-	-	-	42210	17.76	22.15	-	-	-
-	-	-	39785	16.82	20.85	-	-	-
-	-	-	38082	16.46	19.78	-	-	-
-	-	-	36502	15.70	18.73	-	-	-
-	-	-	35026	15.23	18.44	-	-	-
-	-	-	32532	14.90	18.04	-	-	-
-	-	-	30181	14.68	17.73	-	-	-
-	-	-	28642	14.56	17.54	-	-	-
-	-	-	24321	14.26	17.08	-	-	-
-	-	-	22096	14.16	16.93	-	-	-
-	-	-	18710	14.07	16.77	-	-	-
Overtopped	2.55	16.55	16381	14.00	16.64	-	-	-
Overtopped	2.10	16.02	14339	13.92	16.50	-	-	-
Overtopped	2.43	16.27	11829	13.84	16.36	-	-	-
Overtopped	0.91	14.70	9985	13.79	16.28	-	-	-
Overtopped	1.41	15.14	7916	13.73	16.18	-	-	-
Overtopped	1.37	15.05	6340	13.68	16.08	-	-	-
1.03	3.42	15.89	4509	12.47	14.87	-	-	-

Notes: WSEL – Water Surface Elevation
Sec – Survey Cross Section
00-Left Freeboard – Feet above 100-year flood elevation on left side (looking upstream)
Stations are measured in feet from downstream to upstream

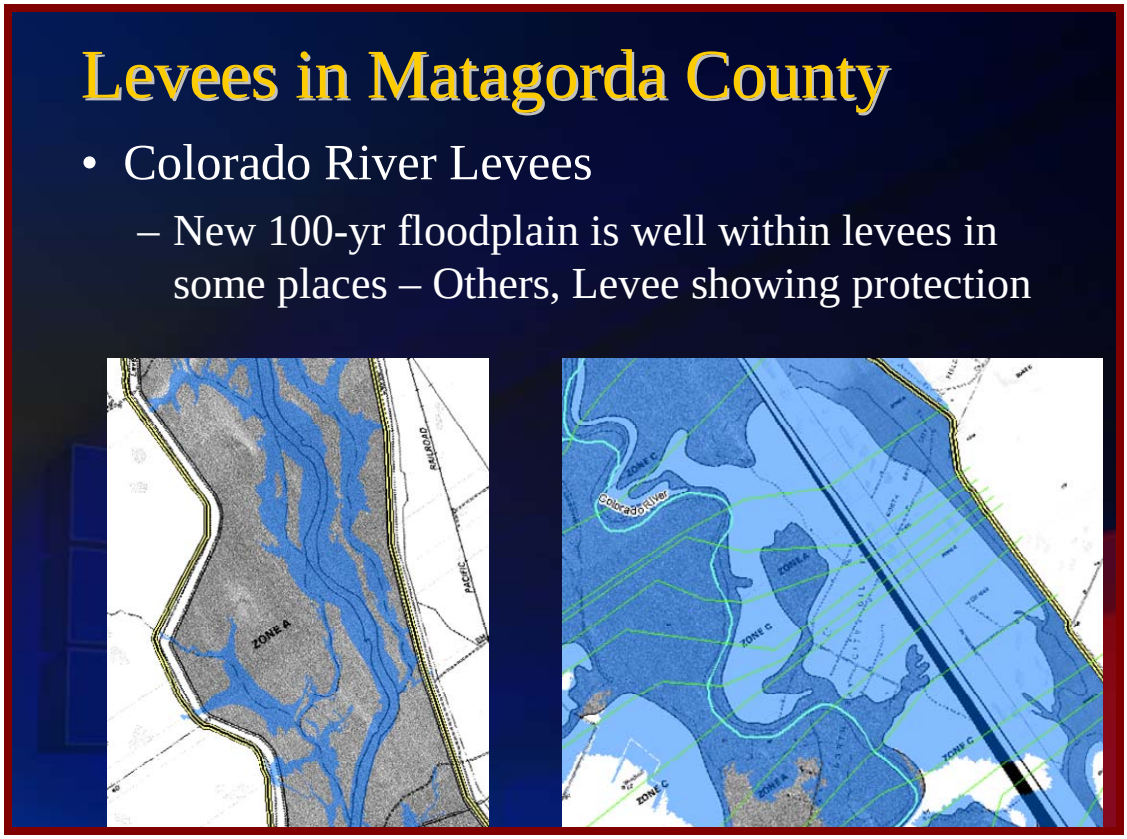

Figure 5: Colorado River Levees in Matagorda County

Figure 6: Flooding in Nearby Wharton - October 1998

The following are major tropical storm and hurricane events that have produced severe flooding and structural damage along the Texas Gulf Coast:

- September 16-20, 1854 – Hurricane
- June 1-5, 1871
- June 8-10, 1871
- September 8-18, 1875
- August 19-24, 1879
- June 21-25, 1880
- June 13-15, 1886
- June 18-16, 1888
- July 4-6, 1888
- July 3-8, 1891
- October 2-7, 1895
- September 10-13, 1897
- September 20-28, 1898
- September 7-10, 1900, "Galveston Great Storm"
- July 21, 1909
- August 16-17, 1915
- September 14, 1919
- August 12-15, 1932
- July 21-27, 1933
- August 26 – September 1, 1934
- October 11-17, 1938
- September 19-25, 1940
- September 11-16, 1941 - Hurricane
- September 16-25, 1941 - Hurricane
- August 30, 1942 - Hurricane
- July 25-29, 1943
- August 24-29, 1945 - Hurricane
- August 15-27, 1947
- September 27 – October 26, 1949
- July 27, 1957 – Hurricane Audrey
- July 24-25, 1959 – Hurricane Debra
- September 11, 1961 – Hurricane Carla
- September 16, 1963 – Hurricane Cindy
- August 6, 1964 – Tropical Storm Abby
- September 20, 1967 – Hurricane Beulah
- August 2-5, 1970 – Hurricane Celia
- September 12-17, 1970 – Tropical Storm Felice
- September 10, 1971 – Hurricane Fern
- September 1-7, 1973 – Tropical Storm Delia
- July 25, 1979 – Tropical Storm Claudette
- August 30, 1979 – Tropical Storm Elena
- August 3-10, 1980 – Hurricane Allen
- September 4-7, 1980 – Tropical Storm Danielle
- August 15-18, 1983 – Hurricane Alicia
- June 23, 1986 – Hurricane Bonnie
- August 9-17, 1987
- June 24-July 1, 1989 – Tropical Storm Allison
- July 30-August 3, 1989 – Hurricane Chantal
- October 12-16, 1989 – Hurricane Jerry
- March 5, 1992 – Houston Area Flood
- October 15-20, 1994 - Southeast Texas Flood
- July 28-August 2, 1995 – Tropical Storm Dean
- August 21, 1998 - Tropical Storm Charley
- September 1998 – Tropical Storm Frances
- June 5-10, 2001 – Tropical Storm Allison
- September 5-7, 2002 – Tropical Storm Fay
- July 15, 2003 – Hurricane Claudette
- August 2005 – Hurricane Rita
- September 12, 2008 – Hurricane Ike

Colorado River Flood Damage Reduction Project

The Fort Worth District, Corps of Engineers initiated the Lower Colorado River Basin Feasibility Study in 2000 that was completed in 2002 and became the building block for FEMA's Map Mod remapping effort for Texas counties within the Lower Colorado River Watershed. The following Fact Sheet published by the Corps of Engineers describes the project:

USACE Fact Sheet: Study of Flooding on the Lower Colorado River

How great is the risk of flood damages along the lower Colorado River, one of the most flood-prone regions of the United States? Has the risk changed over time? Are there effective ways to reduce the risk or the magnitude of damages? A study team formed in July 2000 has published preliminary results that are a key step toward finding solutions to flood problems in the basin. This fact sheet reports on these preliminary findings.

WHO IS CONDUCTING THE STUDY AND WHAT IS ITS PURPOSE?

This study is a building block for a larger effort, called the U.S. Army Corps of Engineers Lower Colorado River Basin Feasibility Study. The Corps of Engineers, LCRA and communities along the lower Colorado River are cooperating on the feasibility study with the goal of improving their knowledge of flooding in the basin and to identify ways to reduce property damage and loss of life during major floods.

The basis of any good decision is accurate information. To gather and analyze the most accurate and up-to-date information possible about flooding in the basin, LCRA and the Corps of Engineers hired a team of consultants in July 2000. The team includes Halff Associates, Inc.; David Ford Consulting Engineers; Espey Consultants, Inc.; and Surveying and Mapping, Inc. The Fort Worth and Tulsa districts of the Corps of Engineers, LCRA, the U.S. Geological Survey and independent consultants reviewed the team's work. The preliminary results were published this month in a draft report called, "Hydrology-Hydraulics Appendix."

WHAT ARE HYDROLOGY AND HYDRAULICS AND WHAT INFORMATION DO THEY PROVIDE?

They are fields of science that examine the probability of flooding and the effects of flooding on the river and surrounding area. The consultants assessed current physical conditions of the river, lakes and surrounding areas. They also analyzed the patterns of past floods and used computer models to help understand and predict how similar floods would affect the river's flow.

HOW WILL THE HYDROLOGY-HYDRAULICS INFORMATION HELP IN IDENTIFYING SOLUTIONS?

It provides the foundation for the Corps of Engineers to determine the damages that are likely to occur as a result of flooding, to identify alternatives for reducing damages, and to select the best alternatives to pursue.

WHAT GEOGRAPHIC AREAS DID THE STUDY INCLUDE?

In general, the consultants studied 473 miles of the lower Colorado River — from San Saba, along the Highland Lakes and downstream to the Gulf of Mexico — and the surrounding 18,000 square mile watershed and tributaries. However, they developed flood models for the Colorado River only, not for the streams and rivers that feed into the Colorado River. Models may be developed later for those tributaries.

WHAT DOES THE STUDY SHOW ABOUT FLOODING ON THE RIVER AND LAKES?

One of the most significant findings has to do with the peak levels expected during a very severe flood, referred to as a 100-year flood. The term 100-year flood has to do with the probability of a flood of such severity occurring in the span of a year. The risk of such severe flooding is 1 out of 100 each year. A flood of that magnitude or greater has occurred on all the Highland Lakes, except Lake Travis. Mansfield Dam and Lake Travis were redesigned to manage floodwaters as a result of a 100-year flood that occurred in 1938, during their construction.

The study shows that peak levels during a 100-year flood would be about the same as calculated in prior studies in the 1970s for most of the Highland Lakes. They are higher on Lake Travis and the section of Lake Marble Falls between the U.S. Highway 281 bridge and Starcke Dam. On Lake Travis, the level would reach 722 feet above mean sea level (msl). (The level of the ocean halfway between high and low tides provides a point of reference for measuring lake and river levels). This is 6 feet higher than the peak level, 716 feet above msl, calculated in the 1970s. On the section of Lake Marble Falls between the bridge and Starcke Dam, the peak level is 2 feet higher: 755 feet above msl.

The analysis of data for the river downstream of Lake Travis is not yet complete. Those results will be reported as soon as they are available, probably in a few weeks.

WHY DID SOME OF THE 100-YEAR FLOOD LEVELS CHANGE?

The new calculations are based on more accurate and complete data than was available when the levels currently in use were established in the 1970s. This is the first comprehensive study of the entire lower Colorado River basin. The study and analysis tools — such as computer models and simulations, aerial and ground surveys and geographic information systems (GIS) — are more sophisticated, powerful and accurate than those used in previous flood studies. More information was available: 25 more years of flood and rainfall records, including several major floods during the 1990s. Also, the study reflects a clearer understanding of the volume and movement of floodwaters, and the limitations on using long-range forecasts as the basis for effective floodgate operations.

WHAT DOES THIS MEAN FOR PROPERTY AROUND LAKE TRAVIS AND THE SECTION OF LAKE MARBLE FALLS BETWEEN THE U.S. HIGHWAY 281 BRIDGE AND STARCKE DAM?

It means the probability of flooding is greater than previously determined. For example, the

probability is 2 percent (or 2 out of 100) per year, instead of 1 percent (1 out of 100) per year that floodwaters will reach 716 feet above msl on Lake Travis or, on the section of Lake Marble Falls between the bridge and Starcke Dam, 753 feet above msl. The probability decreases to 1 percent at 722 feet above msl on Lake Travis and at 755 feet above msl on the section of Lake Marble Falls between the bridge and Starcke Dam.

Keep in mind that 710 feet above msl, recorded on Dec. 25, 1991, is the highest level Lake Travis has reached since it was completed in 1941. The record level on Lake Marble Falls was 756 feet above msl on Sept. 11, 1952. Experts believe a 100-year flood will occur again on the Highland Lakes; they just can't predict when it will happen.

DOES THIS CHANGE THE FLOODPLAIN AROUND LAKE TRAVIS AND LAKE MARBLE FALLS? DO I HAVE TO BUY FLOOD INSURANCE?

The results of this study do not change the official floodplain designations used in the Federal Emergency Management Agency (FEMA) flood insurance program. Communities have the option of working with FEMA to update official floodplain maps. Some, like Wharton and Bastrop counties, have chosen to do so. If you want information about flood insurance, contact Ross Richardson or Carl Watts, FEMA Region VI, at (940) 898-5210.

WHOM SHOULD I CALL TO FIND OUT IF MY PROPERTY IS AT THE 100-YEAR FLOOD LEVEL?

Contact your local floodplain administrator. This city (or county if you live outside city limits) official can help you determine if your property is in the 100-year flood and what flood protection options are available. Keep in mind that this study does not change the official floodplain designations used in the FEMA flood insurance program.

WHAT HAPPENS NEXT?

(Updated to September 2009)

The Corps of Engineers reviewed the consultants' findings, assessed the potential damages from flooding and issued a report in October 2002. The second phase, developing alternatives for reducing the risk of flood damages and selecting the best solutions, was initiated in October 2002. Congressional approval and funding is defined in Water Resources Development Act (WRDA) 2009 for the selected approach.

Hurricane Ike – September 13, 2008

Hurricane Ike was classified as a category 2 hurricane; however, the associated storm surge was equivalent to a Category 4 or possibly 5 hurricane. Hurricane Ike followed the same track as the 1900 storm-making landfall between Galveston Island and Bolivar Peninsula. The resulting disaster FEMA 1791 includes Matagorda County for both Individual Assistance and Public Assistance.

Matagorda County also applied for assistance through the Texas Department of Rural Affairs (TDRA) for 2008 Texas CDBG Disaster Recovery Supplemental Grant Program to aid areas most impacted and distressed by Hurricanes Ike or Dolly.

The following information is included in Exhibit A, Contract No. DRS010112 of the Matagorda County application to TDRA for assistance:

As a result of Hurricane Ike on September 13, 2008, the county's water plants on Sargent Beach failed to function due to a loss of normal electrical power service for several days, and components were inundated and damaged by storm surge. The failure of these facilities to function threatened the public health, safety, and welfare of all served by this facility due to the lack of potable water. The county is in need of adequately sized generators that will act as a backup power supply to operate these facilities, repairs to damaged components, and protection against future storm damage.

The county also experienced a tidal surge from Hurricane Ike that significantly eroded the beach area and dune system at Sargent Beach, and severely damaged the docking facilities at the Port of Palacios. The damage to these facilities threatens the public health, safety, welfare, and economic well-being of all served by these facilities due to the reduction of a natural seawall, and loss of commercial and recreational shipping. The county is in need of beach restoration and repairs to the docks to prevent further beach erosion and bring the Port of Palacios to operable status.

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Water Facilities-1a

Grantee shall purchase and install two (2) permanently affixed, diesel fueled emergency backup generators with automatic transfer switches and associated appurtenances, pads for generator mounting, make repairs and upgrades to equipment, and perform site work associated with construction. Construction shall take place at the following locations:

Location	Activity
Sargent Water Plant #1: Located at the intersection of Canal Drive and FM 457	Install one (1) twenty-five kilowatt (25 kW) generator, upgrade well and pumps, repair elevated structure and building, and rebuild electrical panel and components.
Sargent Water Plant #2: Located near the east end of Canal Drive	Install one (1) seventy-five kilowatt (75 kW) generator, upgrade well and pumps, repair elevated structure and building, and rebuild electrical panel and components.

The installation of these backup generators and repairs and upgrades to pump components will ensure the continuous operation of the water plants and water service.

These activities shall benefit thirty-eight (38) persons, of which thirteen (13), or thirty-four percent (34%) are of low to moderate income.

Flood and Drainage Facilities-5

Port of Palacios Dock Facilities Navigation District No. 1

Grantee shall remove existing damaged timber pier dock and replace it with approximately two hundred fifteen linear feet (215 l.f.) of new bulkhead, consisting of steel pilings capped with concrete. Construction shall take place on the west side of Turning Basin No. 1 in the Port of Palacios, on Tres Palacios Bay in southwestern Matagorda County. The construction of the dock will restore the Port of Palacios to operable status, and enhance the safety and economic benefit that the port provides to residents.

This activity shall benefit five thousand one hundred forty-nine (5,149) persons, of which two thousand six hundred ninety-six (2,696) or fifty-two percent (52%) are of low to moderate income.

Specially Authorized Public Facilities and Improvements-14

Sargent Beach

Grantee shall restore a portion of Sargent Beach by depositing sand and other reconstructive material in an approximately three hundred foot (300 ft.) wide by four thousand foot (4,000 ft.) long area. Construction shall take place at Sargent Beach along Canal Drive from FM 457 to approximately 0.75 miles to the northeast. The restoration of Sargent Beach will provide the area with protection from storm surge and flooding, maintain recreational and economic opportunities, and provide environmental stability and protection.

This activity shall benefit one thousand six hundred forty-five (1,645) persons, of which seven hundred thirty-three (733) or forty-four percent (44%) are of low to moderate income.

1.1 HOW THIS PLAN WAS PREPARED (CRS ACTIVITY 511.1)

Matagorda County has initiated a series of floodplain planning activities to provide better services to the people that live and work in the area. Capitalizing on the technical data available from the US Army Corps of Engineers' Lower Colorado River Flood Damage Elimination Study and FEMA's 2006-2009 Matagorda County Flood Insurance Study and corresponding remapping effort, Matagorda County applied for TWDB Flood Mitigation Assistance (FMA) Program Grant to initiate the county-wide Flood Mitigation Plan that includes Matagorda County and the cities of Bay City and Palacios. In January 2009, Matagorda County and the cities of Bay City and Palacios initiated a coordinated planning effort, funded by the TWDB, to prepare a countywide Flood Mitigation Plan. In May 2009, Matagorda County Consolidated Reclamation

and Drainage District initiated a coordinated effort with Wharton County to extend the Tres Palacios study downstream through Matagorda County.

For preparation of the Matagorda County Flood Mitigation Plan, the Mitigation Planning Committee selected FEMA's ten (10) step-planning procedures outlined in the Community Rating System (CRS) Program Coordinator's Manual. The ten step planning process for the Matagorda County Flood Mitigation Plan is as follows:

1. Organize to prepare the Plan (CRS Activity 511.1)
2. Involve the Public (CRS Activity 511.2)
3. Coordinate with other agencies (CRS Activity 511.3)
4. Assess the Hazard (CRS Activity 511.4)
5. Assess the Problem (CRS Activity 511.5)
6. Set goals (CRS Activity 511.6)
7. Review possible activities (CRS Activity 511.7)
8. Draft the Flood Mitigation Plan (CRS Activity 511.8)
9. Adopt the plan and submit to TWDB (CRS Activity 511.9)
10. Establish procedures to implement, evaluate, and revise the Plan (CRS Activity 511.10)

1.1 ORGANIZE TO PREPARE THE PLAN

In December 2008, the Matagorda County Commissioners Court executed the FMA planning grant contract with the TWDB and a consultant agreement with Halff Associates to assist with the planning effort. From January to July 2009, Matagorda County coordinated with TWDB and Brazoria, Wharton, Jackson and Calhoun counties to develop the Matagorda County Flood Mitigation Plan. In January 2009 the Matagorda County Flood Mitigation Planning Committee was formed.

On January 22, 2009, the Matagorda County Flood Mitigation Planning Committee held its first organizational meeting. The committee is composed of representatives from various county departments dealing with permitting, inspection, and emergency. Participating communities in the planning effort include the cities of Bay City and Palacios. The committee also includes members representing the public. The committee is assigned to oversee the activities of consultant Halff Associates, Inc. hired by Matagorda County to assist in preparation of the Flood Mitigation Plan. Committee members include:

Lisa Krobot	Matagorda Co
Doug Matthes	Matagorda Co. Emergency Management
Ruben Gonzales	Matagorda Co. Environmental Health
Jim Hendricksen	City of Bay City
Don Guynes	City of Palacios
Haskell Simon	Matagorda Co. Resident
Roy Sedwick	LCRA and TFMA
Heidi Carlin	LCRA and TCRFC
Monica Martin	TCRFC Regional Director/Wharton County

David Larner	TWDB
Mark Woolridge	TxDOT Area Engineer
Andy Brzozowski	TxDOT Supervisor
John Ivey	Halff Associates, Inc.
Wes Birdwell	Halff Associates, Inc.
Ron Branyon	Halff Associates, Inc.
Mickey Reynolds	Halff Associates, Inc.

The Matagorda County Flood Mitigation Planning Committee Chairman and "Planner in Charge":

Lisa Krobot, CFM, Floodplain Administrator
Matagorda County Environmental Health Department
2200 Seventh Street
Bay City, Texas 77414
Voice (979) 244-2717 and FAX (979) 244-1967

1.2 FLOOD MITIGATION PLAN SCHEDULE OF PLANNING ACTIVITIES COMPLETED AND PLANNED (CRS ACTIVITY 511.1, 511.2, AND 511.3)

The overall schedule of plan activities for the development, implementation, evaluation and adoption of the Matagorda County Flood Mitigation Plan following the ten (10) planning steps as described in CRS Activity 511.1 through 511.10:

The proposed work schedule and planning steps to be accomplished under this project include the following:

DATE	PROJECT ACTION
June 1970	Matagorda County receives Flood Hazard Boundary Map and enrolls in the NFIP Emergency Program
April 1971	Matagorda County receives Flood Insurance Rate Map and enrolls in the NFIP Regular Program
Mar 1985	Matagorda County receives revised FIRM with wave height data
May 1992	Matagorda County receives revised FIRM
Sep 2002	Tropical Storm Fay causes significant flooding throughout Wharton and Brazoria Counties
July 14, 2004	FEMA approved the TCRFC Mitigation Plan that included Matagorda County and the cities of Bay City and Palacios
April 12, 2006	FEMA conducted the Matagorda County Scoping Meeting in Bay City to kick off the remapping effort for Matagorda County.
September 2007	Matagorda County submitted an application to TWDB for funding to prepare a Flood Mitigation Assistance Plan
May 2008	The TWDB approved the Matagorda Co. FMA Plan application.

DATE	PROJECT ACTION
December 2008	Halff Associates, Inc. selected as consultant to assist in preparation of the plan.
January 13, 2009	Matagorda County Consolidated Conservation and Reclamation District held a public meeting to explain proposed drainage and floodplain studies and levee investigations.
Jan 21, 2009	Lisa Krobot represented Matagorda County at the Houston-Galveston Area Council (HGAC) Flood Coordination Committee meeting to coordination Matagorda County's planning activities with the Texas Colorado River Floodplain Coalition, the Lower Colorado River Authority, Houston-Galveston Area Council and others.
Jan 22, 2009	Initial meeting of the Flood Mitigation Planning Committee. Organize to prepare the Plan (511.1)
Feb 11and 19, 2009	Public Notice and Questionnaires published in local newspapers
Feb 26, 2009	Flood Mitigation Planning Committee Meeting #2 A. Recommendations on methods to involve the Public (511.2) 1. Documents will be prepared for future Commissioners Court Meetings to involve the public in the planning process and to establish a method for the public to provide input into the planning process. 2. A Floodplain Management Plan Questionnaire was prepared for publication in local newspapers. B. Coordination with other agencies (511.3)
March 26, 2009	Flood Mitigation Planning Committee Meeting #3 Assess the Hazard (511.4) Incorporate Matagorda County CRS assessments and other hazard/project information that may be available.
April 15, 2009	Monica Martin, representing TCRFC and Wharton County, attended the HGAC Flood Management Council meeting. John Ivey, representing Matagorda County, participated by conference call, to deliver a report on the status of the Matagorda County Flood Mitigation Plan.
April 17, 2009	John Ivey, Representing Matagorda County, attended the TCRFC Spring Conference in Lakeway, Texas. Matagorda County is participating in the 5-year update of the TCRFC Mitigation Plan.
April 24, 2009	FEMA issued Procedural Memorandums 52 and 53 that outline the mapping requirements for flood protection levees.
April 29, 2009	Members of the Matagorda County Flood Mitigation Planning Committee met during the annual Texas Floodplain Management Association (TFMA) Conference in San Marcos, Texas.

DATE	PROJECT ACTION
May 21, 2009	Flood Mitigation Planning Committee Meeting #4 A. Assess the Problem (511.5) 1. Incorporate risk assessment information available from TWDB, TDEM, FEMA, Houston-Galveston Area Council and others. 2. Assist the Matagorda County Flood Mitigation Planning Committee to review and assess problems. B. Set goals (511.6) Set goals and establish a schedule for the Plan including TWDB Flood Mitigation Plan requirements and future improved CRS ratings
May 29, 2009	FEMA/TWDB Technical Bulletin Workshop in Bay City
June 6, 2009	Bay City Community Hurricane Awareness Conference
July 15, 2009	Lisa Krobot represented Matagorda County at the HGAC Floodplain Management Council meeting in Houston, Texas.
July 23, 2009	Flood Mitigation Planning Committee Meeting #5 A. Review possible mitigation activities (511.7) 1. Summarize Matagorda County Emergency Operations Center activities that meet the objectives of the CRS Activity 511 Floodplain Management Plan and TWDB Flood Mitigation Plan requirements. Explore similar Wharton and Brazoria County activities. 2. Review Matagorda County and each participating community Flood Damage Prevention Ordinance and identify potential improvements. B. Review of the 1st draft of the flood mitigation plan (511.8) and plan to submit to "Other Agencies" for comment. Ensure that the draft plan fulfills the CRS requirement to address a minimum of two (2) of the required six (6) categories: 1. Preventive activities 2. Property protection 3. Natural resource protection 4. Emergency services 5. Structural support 6. Public information
July 29, 2009	Draft plan submitted to "Other Agencies" for review.
September 1, 2009	FEMA Coastal Mapping and Outreach Public Meeting in Bay City

DATE	PROJECT ACTION
September 2, 2009	Matagorda County Consolidated Reclamation and Drainage (MCCRD) #1 Meeting to discuss and review the Matagorda County Levee Study
September 4, 2009	Lisa Krobot represented Matagorda County at the TCRFC Region I meeting in Wharton, Texas to coordinate floodplain activities and report the progress of the Matagorda County Flood Mitigation Plan.
October 13, 2009	Members of the Mitigation Planning Committee met in Galveston during the TFMA Technical Conference to establish the schedule for the final planning steps.
October 16, 2009	Draft Plan updated to include review comments from ”other agencies”
September 4, 2009	Committee Meeting #6 A. Review the updated draft of the Flood Mitigation Plan. B. Finalize Goals and Action Items C. Finalize preparation for the Public Meeting to present the plan. D. Make recommendations on procedures to adopt the plan (511.9) Prepare a schedule of activities leading to Commissioners Court and each City Council approval of the Plan
December 7, 2009	Public Meeting Announcement published in Bay City Tribune
December 14, 2009	Matagorda County Public Meeting to present the plan to the public.
December 17, 2009	The City of Bay City conducted Public Meeting and the City Council passed a resolution formally adopt the Plan
January 12, 2010	The City of Palacios conducted Public Meeting to formally present the Plan to the public and City Council passed a resolution to adopt
January 25, 2010	After formal adoption by all participating communities the Matagorda County Commissioners Court passed a Court Order formally adopt the Plan
February 2010	Procedures implemented to evaluate and revise the plan (511.10)
February 2010	Five (5) copies of the adopted plan submitted to TWDB.
March 2010	TWDB submitted the Matagorda Flood mitigation Plan to FEMA for approval. Matagorda County Flood Mitigation Planning Committee responds to review comments from TWDB and FEMA.
Proposed Actions	
October 2010	Insurance Services Office (ISO CRS) Verification Visit (approximate date).

DATE	PROJECT ACTION
December 2010	Year One Plan Evaluation (Flood Mitigation Plan and TCRFC all hazards Mitigation Plan
October 2010	FEMA/ISO annual review of CRS Programs
December 2011	Year Two Plan Evaluation (Flood Mitigation Plan and TCRFC all hazards Mitigation Plan
October 2011	FEMA/ISO annual review of CRS Programs
December 2012	Year Three Plan Evaluation
October 2012	FEMA/ISO annual review of CRS Programs
December 2013	Year Four Plan Evaluation
October 2013	FEMA/ISO annual review of CRS Programs
December 2014	Year Five Plan Evaluation and Plan Update
October 2014	FEMA/ISO annual review of CRS Programs

1.3 INVOLVE THE PUBLIC

1.3.1 Public Notification and Public Meetings

The Matagorda County Flood Mitigation Plan Committee developed and coordinated public notification procedures that included:

- Matagorda County Consolidated Conservation and Reclamation District held a Public Meeting on January 13, 2009 to discuss proposed drainage and floodplain studies and levee investigations.
- Mitigation Plan "Kick Off" Public Meeting - A Public Meeting was conducted January 22, 2009 as part of the Matagorda County Commissioners Court Meeting. This meeting was to formally "kick-off" the flood mitigation planning effort with representatives from each community present.
- Public Announcements (February 11 and February 19, 2009)
- Flood Mitigation Plan Questionnaire published in local newspapers (February 11 and February 19, 2009)
- Flood Mitigation Plan Questionnaires received and reviewed by the Committee (February through July 2009)
- FEMA Coastal Mapping Meeting held in Bay City September 1, 2009
- TCRFC Regional Floodplain Coordination Meeting held in Bay City September 4, 2009
- Public Meeting to formally present the Flood Mitigation plan held in conjunction with Matagorda County Commissioners Court Meeting (December 14, 2009)
- Public Meeting to formally present the Flood Mitigation plan held in conjunction with City of Bay City - City Council Meeting (December 17, 2009)

- Public Meeting to formally present the Flood Mitigation plan held in conjunction with City of Palacios City Council Meeting (January 12, 2012)

Plan Section 7.0 outlines the procedures followed by Matagorda County and the cities of Bay City and Palacios to formally adopt the Flood Mitigation Plan.

The following Public Announcement was published in the Bay City Tribune and the Matagorda Advocate newspapers on February 11, 2009 and February 19, 2009 and included a Flood Mitigation Questionnaire as an attachment:

Matagorda County Flood Mitigation Plan

Matagorda County has initiated planning efforts to prepare a Flood Mitigation Plan to compliment the Texas Colorado River Floodplain Coalition (TCRFC) all-hazards Mitigation Plan that includes **Matagorda County** and the cities of **Bay City and Palacios**. Currently Matagorda County and all communities participate in the National Flood Insurance Program (NFIP). The purpose of the NFIP is to identify and mitigate the impact of floods and natural disasters including the regulation of development within special flood hazards areas, which in turn, allows citizens within each community to purchase flood insurance at an affordable rate.

Current Matagorda County (county-wide) Flood Insurance Coverage

- Coverage ($) $717,445,500
- Policies in Force 3,884
- Claims Paid 1,391
- Claims Paid ($) $14,043,933
- Policy Premiums ($) $ 2,690,321 per year

NFIP Policies and Claims data is current as of February 28, 2009.

Matagorda County and the cities of Bay City and Palacios are subject to flooding from coastal storms and overflows from the Colorado and Tres Palacios Rivers, Caney Creek and numerous smaller creeks and bayous. Fortunately, Matagorda County escaped the most severe wrath of Hurricane Rita and Ike but Matagorda County wants to be prepared for future flood events.

In early 2008, the Matagorda County Commissioners Court announced the initiation of planning efforts to prepare the Matagorda County Flood Mitigation Plan and approved hiring Halff Associates, Inc. to assist with the planning effort.

Representatives for Matagorda County and the cities of Bay City and Palacios met on January 22, 2009 to initiate the planning effort and to outline how the plan will be developed, how to encourage public participation in the planning process, and identify “other agencies” that need to be involved in the planning process. A Flood Mitigation Plan Questionnaire was published to encourage public participation in the planning process.

The Texas Water Development Board has awarded $50,000 to Matagorda County in federal funding through FEMA's Flood Mitigation Assistance (FMA) Program. Matagorda County and the cities of Bay City and Palacios will be required to fulfill both the Texas Water Development Board and the Federal Emergency Management Agency (FEMA) planning requirements. The Flood Mitigation Plan, which is scheduled to be completed in December 2009, will be formally presented at a public meeting prior to formal adoption by the Matagorda County Commissioners Court and the City Council of Bay City and Palacios.

Matagorda County and participating communities will evaluate participation in FEMA's Community Rating System (CRS) Program. Participation in CRS can result in reductions in flood insurance policy premiums for properties located within the unincorporated areas of Matagorda County. The CRS Program is available only to communities that participate in the National Flood Insurance Program (NFIP) and have adopted a floodplain management program that exceeds the NFIP guidelines. Only 47 communities in Texas participate in the CRS program and those communities receive annual flood insurance premium reductions based on the CRS classification. Adoption of an approved Flood Mitigation Plan is an approved activity for a CRS community and establishes eligibility for Matagorda County to receive Flood Mitigation Assistance (FMA) Project funding.

The public is invited to participate in the planning process, which will be conducted under the supervision of Ms. Lisa Krobot, CFM, Matagorda County Floodplain Administrator and housed in the Matagorda Department of Health, (979) 244-2717. Ms. Krobot receives Flood Mitigation Plan Questionnaires from the public to help guide the planning effort.

Matagorda County Consolidated Conservation and Reclamation District Public Meeting Regarding Proposed Drainage Studies and Levee Inspections

The following is a Public Notice that was posted in January 2009 announcing a public meeting related to the Matagorda County Flood Mitigation Plan.

Matagorda County Consolidated Conservation and Reclamation District is conducting drainage studies and preparing floodplain mapping on the Colorado and Tres Palacios rivers in Matagorda County to be incorporated into the FEMA Matagorda County remapping effort. The District has also engaged a consultant, Halff Associates, to evaluate the Colorado River levees and Town of Matagorda Ring Levee. A public meeting was conducted on January 13, 2009 as part of the Matagorda County Commissioner's Court to present the study goals and schedule. Information will also be gathered from property owners and other residents regarding flooding problem areas throughout the county.

Halff Associates was selected by the Matagorda County Conservation and Reclamation District to evaluate the Colorado River levees in Matagorda County. These levees were constructed before the Highland Lakes. The LCRA/USACE 2003 Flood Damage Evaluation Project found that the unregulated (pre-Highland Lakes) 100-Year flood in Wharton County was 215,000 cfs, and the regulated (current conditions) flood was half of that. Therefore, there may be sections of

levees downstream in Matagorda County that were designed in the early 1900's for much higher flows and there is no longer a reason to spend money maintaining and regulating them.

Matagorda County has a total of 42.05 miles of Colorado River levees (see Figure 4) and in several areas the 100-Year flood does not touch the levee. This condition occurs primarily on the west (right) side of the river, but does occur in areas on the east (left) side (see Table 2 Colorado River Levee Freeboard Calculations). In 2009, the Conservation and Reclamation (C&R) District initialed a study to determine Colorado River sections that the District owns in fee or easement. The District plans to "decommission" or return non-critical levee sections back to the property owner to use as they see fit. It some cases, these non-critical levee sections may actually be causing local flooding and the property owner may choose to remove them.

The C&R District study focus is on the critical levees along the Colorado River and the ring levee at the Town of Matagorda, to certified and obtain accreditation by FEMA and properly maintain and operate these levees as required to meet Corps and FEMA requirements.

The Halff Associates Study divides the river levees into 3 categories:

1. Those sections the current FEMA/USACE approved 100-Year flood does not touch
2. Those sections the current FEMA/USACE 100-Year flood touches but without FEMA accredited levees does not flood anything critical (structures, homes, etc)
3. Those levee sections where the current FEMA/USACE 100-Year flood touches and may allow flooding of critical public/private infrastructure. These levee sections should be accredited by FEMA and requiring certification by a professional engineer.

An anticipated recommendation from the study, to be completed in early 2010, is for the District to de-commission categories 1 and 2 above, if supported by engineering study. In that instance, there is a question regarding Texas Commission on Environmental Quality (TCEQ) requirements. Matagorda County attempted to abandon these levees approximately 40 years ago, but were informed by the State that the County must continue to maintain them. Possible options for Matagorda County to pursue:

1. Matagorda County submits a request to TCEQ to abandon unneeded levee.
2. Conduct a public meeting in Matagorda County explaining the County's intention.
3. Do not delineate Category 1 and 2 river levees on the new Matagorda County Digital Flood Insurance Rate Maps (DFIRMs).

FEMA Coastal Mapping and Gulf Coast Hurricane Surge Study Public Meeting

Date/Time: Tuesday, September 1, 2009 from 9 to 11 a.m.

Meeting Location: 2200 7th St, Bay City, TX (77414)
4th floor Conference Room
County Annex Building

Meeting Agenda: Introduction
Study Overview and Status Update
Levees
Post-Preliminary Process
Outreach Moving Forward

Coordinator:

Diane Howe, CFM
Program Specialist (Outreach)
Risk Analysis Branch
FEMA - Region VI
800 N. Loop 288
Denton, TX 76209
Office: 940-898-5171

Larry Voice
Coastal Mapping Specialist
Risk Analysis Branch
FEMA - Region VI
800 N. Loop 288
Denton, TX 76209

Matagorda County Conservation & Reclamation District No. 1 Meeting to Review and Discuss the Matagorda County Levee Study.

NOTICE OF MEETING
MATAGORDA CO. CONSERVATION & RECLAMATION
DISTRICT NO. 1

In accordance with provisions of Article 6252-17, of Vernon's Civil Statutes, as amended, Matagorda County Conservation & Reclamation District No. 1, an agency of the County of Matagorda, whose address is 491 CR 415, Bay City, Texas 77414, hereby gives notice of a meeting of its Board of Directors to be held on the 3rd Floor, in the Kitchen Area at the Matagorda County Courthouse in Bay City, TX on Wednesday, September 2, 2009 at 10:00 a.m.

Dwight Vavra, Director

RECEIVED
AUG 31 2009
HALFF

1. Call Meeting to Order
2. Recognize Visitors
3. Read and Approve Minutes from Previous Meeting
4. Review, Discuss, and Adopt 2009 Proposed Tax Rate
5. Halff and Associates' Levee Study Update and Report
6. Adopt Matagorda Ring Levee Structure Resolution
7. Discuss Flag Pole Variance
8. Discuss and Adopt Matagorda Ring Levee Use Agreement With County
9. Discuss the LCRA Interlocal Agreement
10. Discuss and Accept Reed & Associates Contract
11. Old Business
12. Report from Conservation & Reclamation's Attorney
13. Accept Investment Report
14. Matagorda Ring Levee Report
15. Approve and Pay Bills
16. Adjourn

Public Meetings to Formally Present the Matagorda County Flood Mitigation Plan

Matagorda County – County-Wide Public Meeting for the Flood Mitigation Plan:

On December 7, 2009 a notice was placed in the Bay City Tribune announcing the public meeting to discuss the Matagorda County Flood Mitigation Plan. The Public Meeting was held on December 14, 2009 in the Matagorda County Commissioners Courtroom. The Flood Mitigation Plan was approved by the Commissioners Court during the regular Court meeting on February 1, 2010. Copies of the public notice and Commissioner's Court Order adopting the Plan are included in Attachment C.

City of Bay City:

On December 7, 2009 a notice was placed in the Bay City Tribune announcing the public meeting to discuss the Matagorda County Flood Mitigation Plan. The Public Meeting was held on December 17, 2009 in the City of Bay City Council Chambers. The Flood Mitigation Plan was approved by the City Council during the regular Council meeting on December 17, 2009. Copies of the public notice and Resolution No. R-2009-24 adopting the Plan are included in Attachment C.

City of Palacios:

On January 7, 2010 a notice was released announcing the public meeting to discuss the Matagorda County Flood Mitigation Plan. The Public Meeting was held on January 12, 2010 in the City of Palacios Council Chambers. The Flood Mitigation Plan was approved by the City Council during the regular Council meeting on January 12, 2010. Copies of the public notice and Resolution No. 2010-R-1 adopting the Plan are included in Attachment C.

1.3.2 Flood Mitigation Plan Questionnaire

The Flood Mitigation Plan Questionnaire, Figure 8, was developed during Flood Mitigation Plan Committee Meeting #1 and finalized at Committee Meeting #2. The questionnaire requesting public input was published in local newspapers and a summary of the 44 questionnaire responders is included below. The questionnaire, Public Notices and related newspaper articles are provided in Plan Attachments “B” and “C”.

1. Do you live in a Designated Flood-prone Area? 86% Yes; 14% No
2. Do You carry Flood Insurance? 57% Yes; 43% No
3. Has Your Home ever flooded? 20% Yes; 78% No; 2% Unknown
4. Were the Flood-Depths over one foot? 50% Yes; 50% No

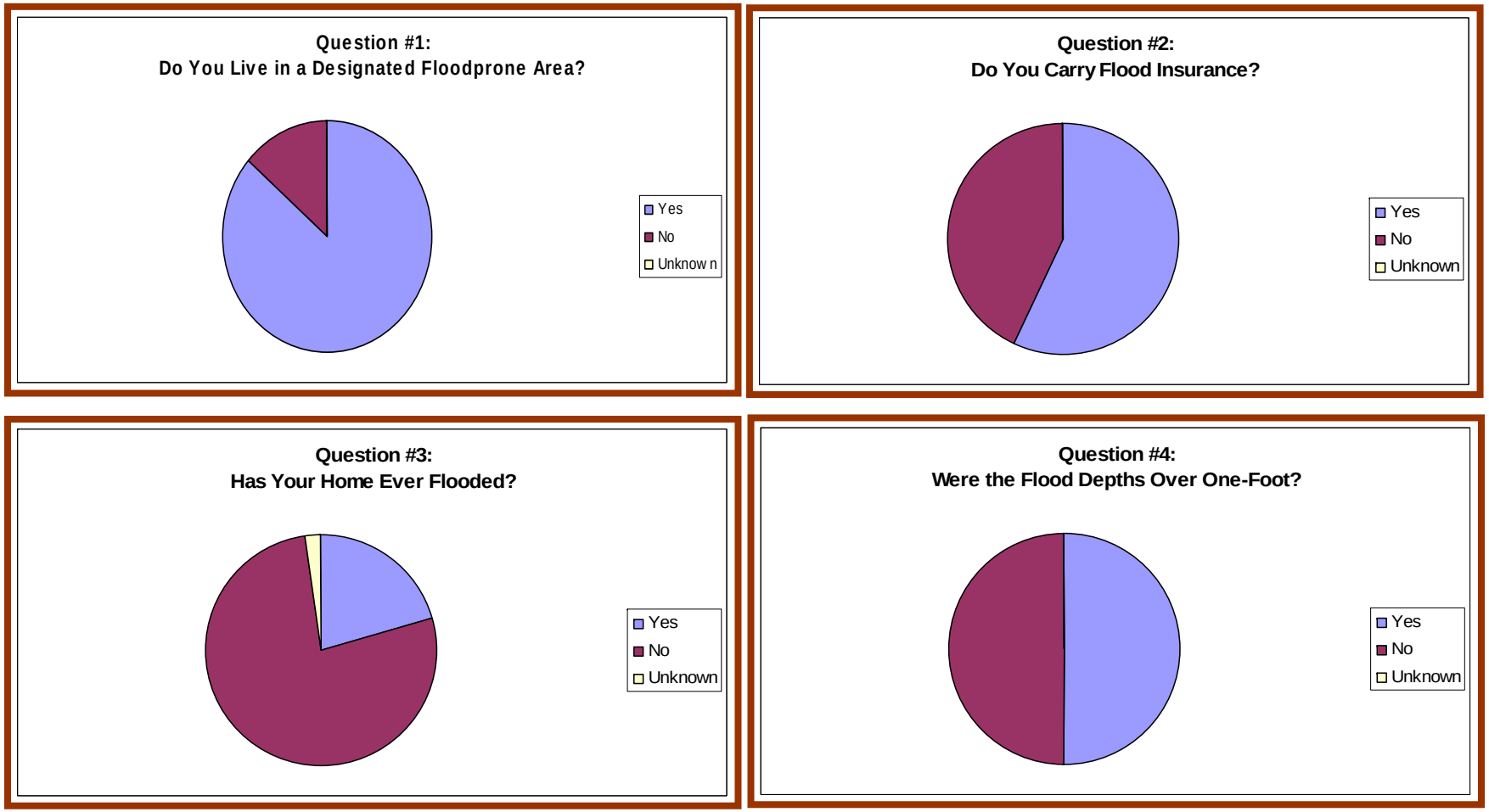


Figure 7: Questionnaire Summaries

FLOOD MITIGATION PLAN QUESTIONNAIRE

MATAGORDA COUNTY FLOOD MITIGATION PLAN

Please take a few minutes to identify your hazard concerns using this Questionnaire and return it to the Matagorda County Permits Department by March 15, 2009 if possible. The Matagorda County Flood Mitigation Planning Committee will review the completed questionnaires and recommendations will be considered in development of the Flood Mitigation Plan. Current target completion date for the Matagorda County Plan is July 2009.

YOUR INPUT IS IMPORTANT!!!!!

1. Do you live in a designated flood hazard area? ___ Yes ___No ___ Unknown

2. Do you currently carry flood insurance? ___ Yes ___No ___ Unknown

3. Has your home ever flooded with water in the house? ___Yes ___No

4. Dates your home has flooded: _____
   _____
   _____

   Flooding Source:_____ Depth of water in home: _____

5. Do you live in: Matagorda County (unincorporated area) _____
   City of Bay City _____
   City of Palacios _____

6. What do you recommend to reduce flood hazards in Matagorda County?

7. Name and Address – or area of concern:

Attach additional sheets if necessary.

Your input is important. This questionnaire will provide valuable insight in developing the goals and objectives for the Matagorda County Flood Mitigation Plan. Please return completed questionnaires to:

Matagorda County Public Health Department
2200 Seventh Street
Bay City, Texas 77414

1.4 COORDINATION WITH OTHER AGENCIES

Matagorda County approached flood mitigation planning in two phases. Initially, the County developed a core Flood Mitigation Plan Committee comprised of individuals employed by the County and representatives from all participating communities and the general public. Additionally, the County enlisted the assistance of individuals selected to participate from a variety of "Other Agencies". Representation consists of auxiliary agencies, surrounding jurisdictions, and various levels of governmental departments – local, state, and federal. "Other Agencies" were contacted by letter and invited to participate in the planning process. The "Draft" Flood Mitigation Plan was distributed to other agencies for review and comment prior to finalizing mitigation actions and formal adoption by the Matagorda County Commissioners Court and participating communities.

1.4.1 MEETINGS WITH OTHER AGENCIES TO REVIEW COMMON PROBLEMS

Representatives from the Matagorda County Flood Mitigation Planning Committee met with the following agencies to discuss the development of the Flood Mitigation Plan and to discuss the common hazards the affect the surrounding communities:

Texas Water Development Board (TWDB)
Texas General Land Office (GLO)
Lower Colorado River Authority (LCRA)
Texas Colorado River Floodplain Coalition (TCRFC)
Texas Department of Transportation (TxDOT)
Natural Resource Conservation Service (NRCS)
US Army Corps of Engineers – Galveston District (USACE)
Houston-Galveston Area Council (HGAC)

FEMA Region VI conducted a countywide outreach meeting in Bay City on September 1, 2009 and presented information to the public regarding the new Matagorda County Digital FIRMs that will include information from the joint USACE/FEMA Texas Gulf Coast Hurricane Surge Study.

The TCRFC Region I Meeting was held in Wharton, Texas on September 4, 2009 to coordinate floodplain activities within the Lower Colorado River Basin. The meeting included a Matagorda County Flood Mitigation Plan progress report presented by Lisa Krobot, CFM, Matagorda County Floodplain Administrator.

1.5 ESTABLISHING PLANNING GOALS

On January 22, 2009, the Flood Mitigation Planning Committee met to discuss the flood mitigation planning goals. The committee finalized the public questionnaire and methods to distribute. The Flood Mitigation Planning Committee reviewed the planning goals from the TCRFC All Hazards Mitigation Plan prepared by the TCRFC that included input from Matagorda County and the cities within the county. The goals and objectives of the TCRFC All

Hazards Mitigation Plan were reviewed during the planning process to help identify specific flood mitigation goals to be addressed in the Flood Mitigation Plan.

On February 26, 2009, the Flood Mitigation Planning Committee met to review the Goals and objectives from the TCRFC, the Matagorda County all-hazards Mitigation Plan and recent Flood Mitigation Plans prepared following TWDB guidelines. On May 21, 2009 the Committee finalized the goals and objectives for the Matagorda County Flood Mitigation Plan. The Matagorda County Flood Mitigation Plan Goals are described in Section 4.0 of this Plan.

1.6 DISTRIBUTION OF THE DRAFT FLOOD MITIGATION PLAN

On July 29, 2009, Lisa Krobot, Matagorda County Floodplain Administrator submitted the initial draft of the Flood Mitigation Plan to "Other Agencies" for review with comments and recommendations. These agencies were requested to review common problems, development policies, mitigation services, inconsistencies and conflicts in policies, plans, programs, and regulations. They were also requested to review to community's needs, goals, and plans for the area.

Recommendations and comments were received from:

Lower Colorado River Authority (LCRA)

Texas Colorado River Floodplain Coalition (TCRFC) – Mitigation actions incorporated into the TCRFC Mitigation Action Plan (2009 plan update)

Houston-Galveston Area Council (HGAC)

Brazoria County

2.0 ASSESS THE HAZARD (CRS ACTIVITY 511.4)

Matagorda County has experienced emergencies and disasters in the past and expects that emergencies and disaster will occur in the future. Due to location and geographic features, Matagorda County is vulnerable to the damaging effects of certain hazards that include but are not limited to: hurricanes and tropical storms; extreme heat; flash flood; severe thunderstorm; tornado; winter weather; lightning; hazardous substance releases; power/utility outages; fire/explosion; building/structure collapse; mass casualty incidents; transportation accidents; terrorism/sabotage; hostage situation; and attack (conventional, nuclear, biological, chemical).

Natural disasters and emergencies affect Matagorda County more often than other types of emergencies and disasters. Of the natural disasters that have occurred, flooding is by far the most common event to affect the area. Damaging flood events have occurred within the County on average, at least once each year.

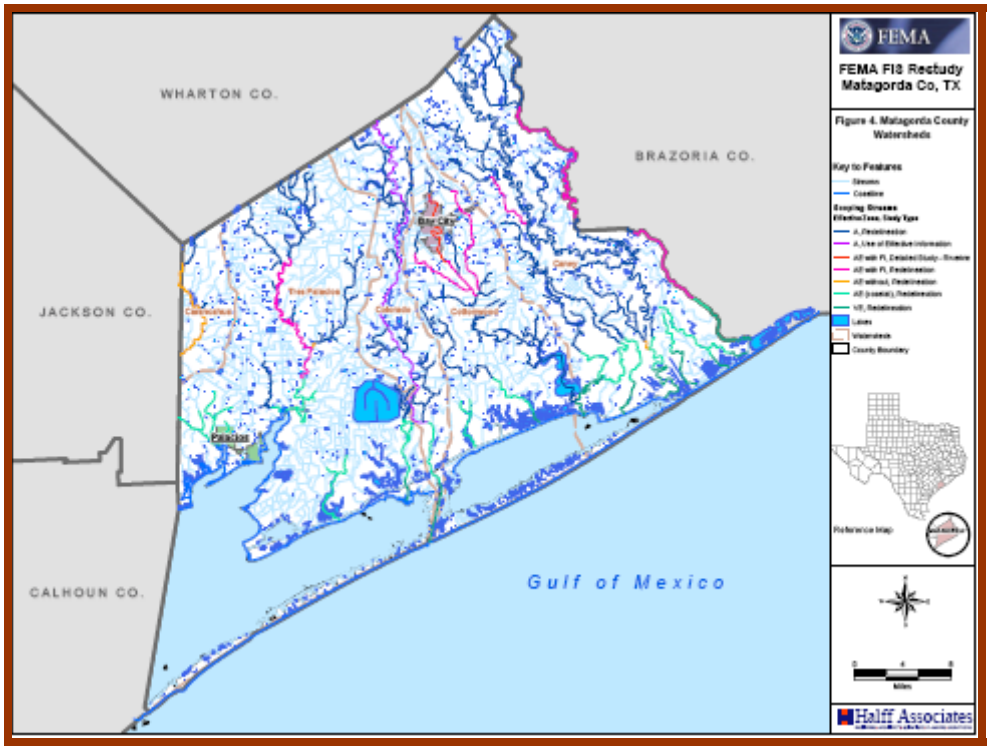


Figure 9: Matagorda County Watersheds

2.1 MAP OF KNOWN FLOOD PRONE AREAS.

The flood hazards for Matagorda County were initially identified in 1970 by the Federal Insurance Administration and published as Flood Hazard Boundary Maps. In the early 1980's flood insurance studies were initiated by FEMA for Matagorda County and the cities of Bay City and Palacios. The initial FIRMs were published as individual community FIRMs but FEMA's ongoing remapping effort for Matagorda County will result in a countywide digital FIRM. The FIS and related mapping published for Matagorda County and participating communities are listed below:

Matagorda County Unincorporated Areas:

June 19, 1970	Matagorda County Flood Hazard Boundary Map (FHBM)
May 1, 1971	Matagorda County Flood Insurance Study and FIRMs
December 31, 1971	Matagorda County Flood Insurance Study and FIRMs
May 26, 1972	Matagorda County Flood Insurance Study and FIRMs
July 1, 1974	Matagorda County Flood Insurance Study and FIRMs
March 5, 1976	Matagorda County Flood Insurance Study and FIRMs
March 18, 1985	Matagorda County Flood Insurance Study and FIRMs
May 4, 1992	Matagorda County Flood Insurance Study and FIRMs

City of Bay City:

August 11, 1970	City of Bay City FHBM
April 23, 1971	City of Bay City Flood Insurance Study and FIRMs
June 5, 1985	City of Bay City Flood Insurance Study and FIRMs

City of Palacios:

August 11, 1970	City of Palacios FHBM
November 13, 1970	City of Palacios Flood Insurance Study and FIRMs
July 1, 1974	City of Palacios Flood Insurance Study and FIRMs
September 15, 1983	City of Palacios Flood Insurance Study and FIRMs
February 5, 1986	City of Palacios Flood Insurance Study and FIRMs

The Matagorda County, city of Bay City and city of Palacios FIRM Panels that show flood hazards within Matagorda County are as follows:

Panel Number	**Date**	**Map Scale**
City of Bay City FIRMs and Floodway Maps		
4854890025C	March 18, 1985	1 inch = 2000 feet
4854890050C	March 18, 1985	1 inch = 2000 feet
4854890075C	March 18, 1985	1 inch = 2000 feet
4854890100C	March 18, 1985	1 inch = 2000 feet
4854890115C	March 18, 1985	1 inch = 1000 feet
4854890120C	March 18, 1985	1 inch = 1000 feet
4854890125C	March 18, 1985	1 inch = 2000 feet
4854890150C	March 18, 1985	1 inch = 2000 feet
4854890175C	March 18, 1985	1 inch = 2000 feet
4854890200C	March 18, 1985	1 inch = 2000 feet
4854890225C	March 18, 1985	1 inch = 2000 feet
4854890230^{E}	December 4, 1985	1 inch = 1000 feet
4854890230^{E} (floodway map)	March 18, 1985	1 inch = 1000 feet
4854890235C	March 18, 1985	1 inch = 1000 feet
4854890235^{E} (floodway map)	March 18, 1985	1 inch = 1000 feet
4854890240C	March 18, 1985	1 inch = 1000 feet
4854890240^{E} (floodway map)	March 18, 1985	1 inch = 1000 feet
4854890245C	March 18, 1985	1 inch = 1000 feet
4854890245^{E} (floodway map)	March 18, 1985	1 inch = 1000 feet
4854890275C	March 18, 1985	1 inch = 2000 feet
4854890275^{E} (floodway map)	March 18, 1985	1 inch = 2000 feet
4854890300C	March 18, 1985	1 inch = 1000 feet
4848900330^{E} (floodway map)	March 18, 1985	1 inch = 1000 feet
4854890375C	March 18, 1985	1 inch = 2000 feet

Panel Number	Date	Map Scale
City of Bay City FIRMs and Floodway Maps		
4854890400C	March 18, 1985	1 inch = 2000 feet
4854890425C	March 18, 1985	1 inch = 2000 feet
4854890450D	May 4, 1992	1 inch = 2000 feet
4854890475C	May 4, 1992	1 inch = 2000 feet
4854890475D (floodway map)	March 18, 1985	1 inch = 2000 feet
4854890500D	May 4, 1992	1 inch = 2000 feet
4854890501C	March 18, 1985	1 inch = 500 feet
4854890502C	March 18, 1985	1 inch = 500 feet
4854890503C	March 18, 1985	1 inch = 500 feet
4854890504C	March 18, 1985	1 inch = 500 feet
4854890525D	May 4, 1992	1 inch = 2000 feet
4854890550C	March 18, 1985	1 inch = 2000 feet
4854890555D	May 4, 1992	1 inch = 1000 feet
4854890560D	May 4, 1992	1 inch = 1000 feet
4854890565D	May 4, 1992	1 inch = 1000 feet
4854890570D	May 4, 1992	1 inch = 1000 feet
4854890600D	May 4, 1992	1 inch = 2000 feet
4854890625D	May 4, 1992	1 inch = 2000 feet
4854890650C	May 4, 1992	Not Printed
4854890675D	May 4, 1992	1 inch = 2000 feet
4854890700D	May 4, 1992	1 inch = 2000 feet
4854890750D	May 4, 1992	1 inch = 2000 feet
4854890775D	May 4, 1992	1 inch = 2000 feet
City of Bay City FIRMs and Floodway Maps		
4854550005C (Bay City)	June 5, 1985	1 inch = 800 feet
4854550005C (Bay City FW)	June 5, 1985	1 inch = 800 feet
City of Palacios FIRMs and Floodway Maps		
4854950001D (Palacios)	February 5, 1986	1 inch = 500 feet
4854950001D (Palacios FW)	February 5, 1986	1 inch = 500 feet

Map Needs Assessment

In 1994, the Mapping Needs Assessment Process was established by FEMA to identify and prioritize community map update needs in accordance with Section 575 of the *National Flood Insurance Reform Act* of 1994. Since May of 1997, more than 11,700 communities have been contacted for map update needs. Information regarding mapping needs is collected by FEMA in the Mapping Needs Update Support System (MNUSS).

FEMA, in 1997, designed a plan to modernize the Nations' map inventory. Over time, the objective is to eliminate the existing backlog of outdated maps and to convert all FIRMs to a

digital format. One of the key objectives of the modernization plan is to increase local involvement in, and ownership of, the flood mapping process. The Cooperating Technical Partner (CTP) concept was developed specifically to accomplish this goal. Under the CTP initiative, FEMA enters into agreements with technically capable community partners to produce agreed-upon products that supplement ongoing FEMA mapping efforts.

In 2000, the LCRA executed a CTP Agreement with FEMA. The first Activity Agreement generated under this partnership was to conduct a MNUSS Assessment for the eleven counties within the LCRA watershed including Matagorda County and the cities of Bay City and Palacios. This CTP Activity established the basis for FEMA's MNUSS Database in Matagorda County and led to the Matagorda County FIS and remapping effort initiated in 2006 and scheduled for completion in 2010.

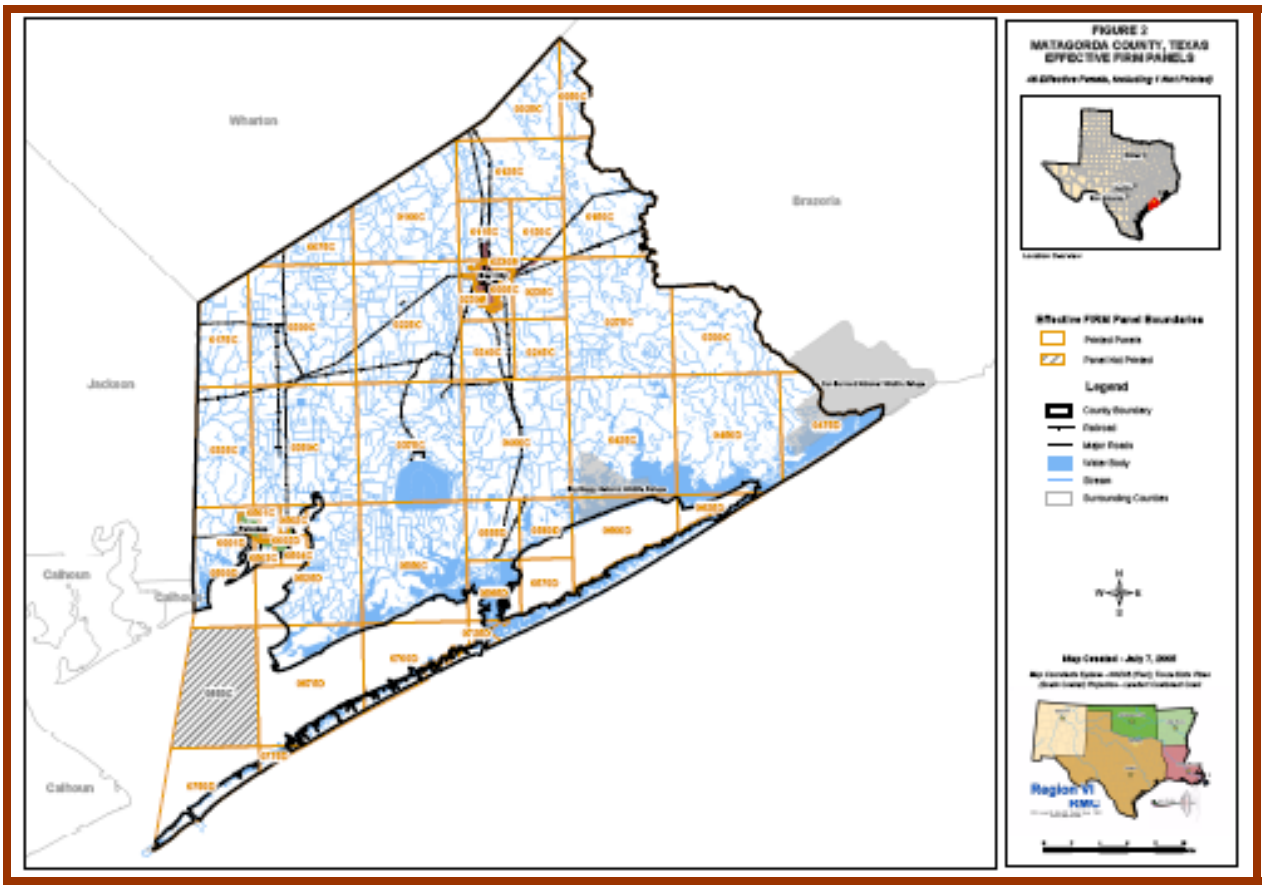


Figure 10: Effective Matagorda County FIRM Panels

The current Matagorda County, city of Bay City and city of Palacios FIRM published by FEMA in 1985, 1986 and 1992, includes all incorporated and unincorporated areas within Matagorda County.

FEMA Map Mod Initiative

In 2003, FEMA launched a nation-wide remapping initiative to update flood hazard maps and replace paper FIRMs with digital DFIRMs. In 2006, following Hurricanes Katrina and Rita, FEMA initiated the Texas Gulf Coast remapping effort. In April 2006, Halff Associates, FEMA's remapping contractor, conducted Scoping Meetings with Matagorda, Jackson, Victoria, Calhoun, Refugio, and Aransas counties for the center section of the Texas Gulf Coast remapping effort as described in Figure 11, FEMA Scoping Project Location Map.

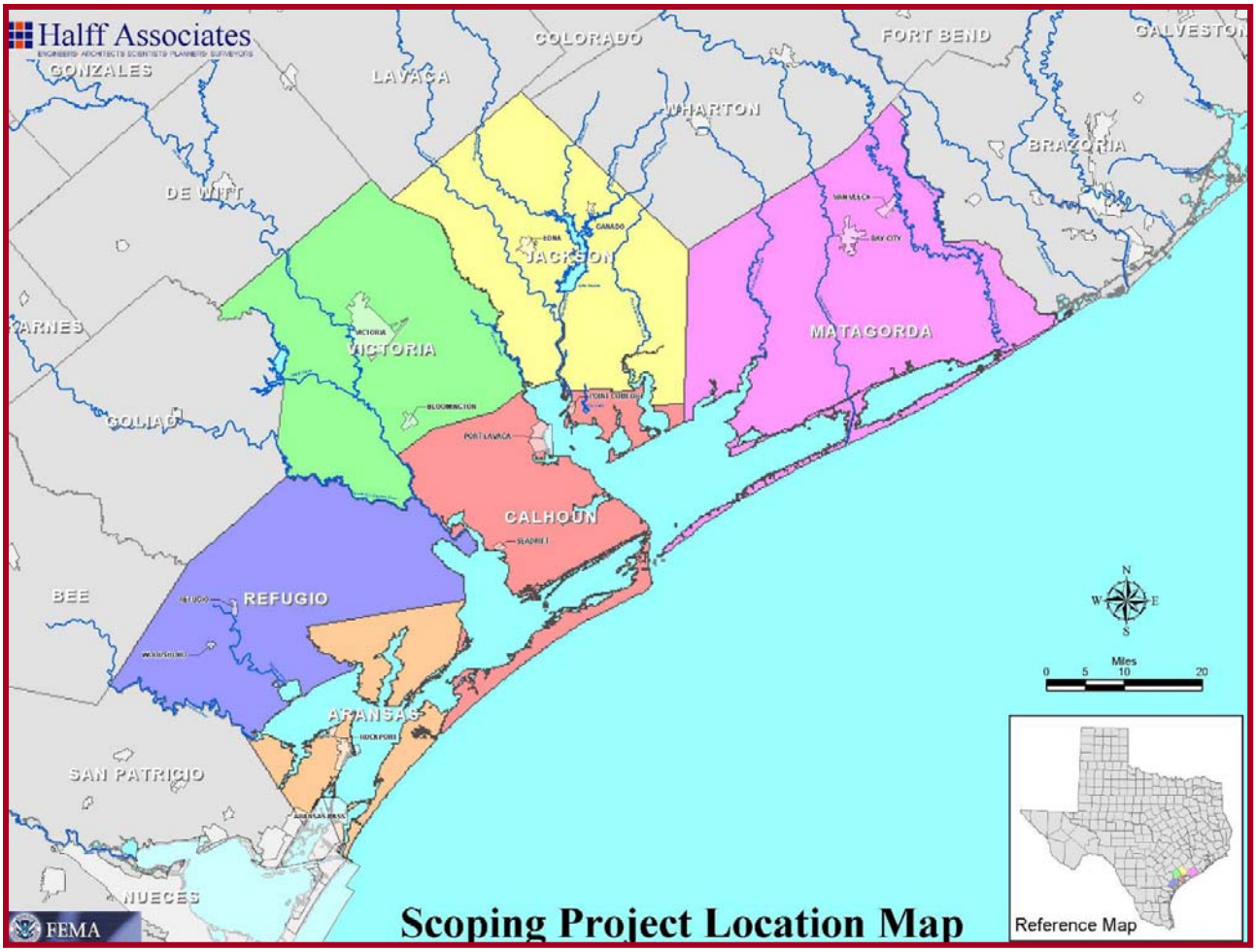


Figure 11: FEMA Scoping Project Location Map

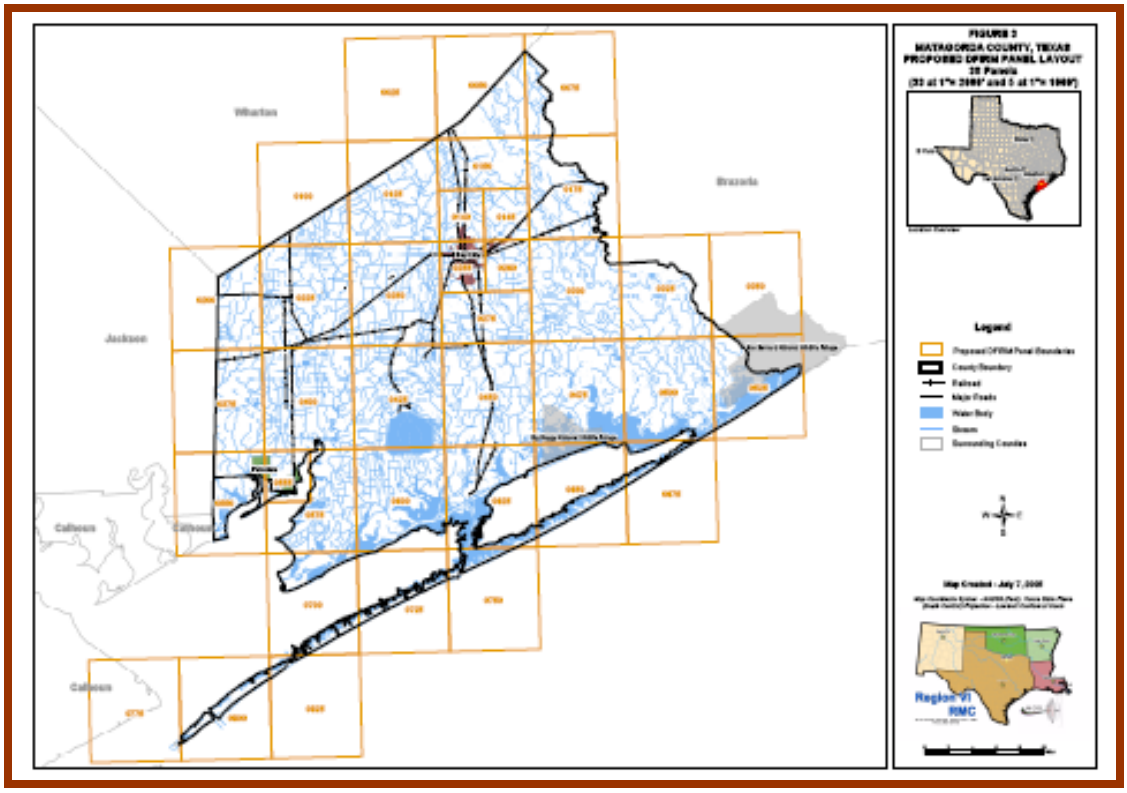


Figure 12: Proposed Matagorda County FIRM Panel Layout

November 2003 News Release:

FACT SHEET: FEDERAL STUDY OF FLOOD RISKS ON LAKE TRAVIS, COLORADO RIVER

A large flood on the lower Colorado River could cause $338 million in economic damages from Lake Buchanan through Matagorda County, according to a study by the U.S. Army Corps of Engineers. The study shows that potential flood damages, particularly around Lake Travis, are greater than previously thought. This fact sheet reports on findings from the first phase of the Lower Colorado River Basin Study.

WHAT IS THE SOURCE AND PURPOSE OF GATHERING THIS INFORMATION?

The U.S. Congress approved the Corps of Engineers study based on requests by the City of Austin and LCRA, representing cities and counties in the river basin that want to find solutions to flood damage problems. The study partners — LCRA, Austin, Sunset Valley, Travis County and Wharton — want to improve knowledge of flooding in the basin and identify ways to reduce property damage and loss of life. A major finding of the study, first reported in April 2002, showed that Lake Travis would rise nearly 6 feet higher during a 100-year flood than the official figure adopted in the 1970s. Based on that dramatic difference, the study was expanded to specifically address the 100-year flood elevation on Lake Travis.

WHAT KIND OF PROPERTY DAMAGE WOULD A LARGE FLOOD CAUSE?

Estimated impact of severe floods by county

The first two columns of figures show the estimated number of homes and other structures that 100-year and 500-year floods would damage in counties along the lower Colorado River. The damages columns include estimates for structures, vehicles and crops. Dollar figures in thousands.

	Number of structures		Damages (in thousands)	
County	100-year	500-year	100-year	500-year
Burnet	1,149	3,876	$ 38,347	$ 210,078
Llano	1,265	3,814	32,365	227,295
Travis	2,032	5,493	192,691	1,047,365
Bastrop	350	1,411	6,782	42,494
Fayette	635	2,397	23,542	135,845
Colorado	943	2,862	9,415	55,218
Wharton	5,290	8,404	67,248	118,024
Matagorda	736	1,055	17,703	63,719
Totals	12,400	29,312	$ 388,093	$1,900,038

Source: U.S. Army Corps of Engineers

The chart above shows the economic damage that 100- and 500-year floods would cause from Lake Buchanan through Matagorda County, according to the Corps of Engineers report. The damage estimates include structures of significant value such as homes and businesses, vehicles and crops. According to the report, a 100-year flood, if it occurred throughout the basin, could damage 12,400 homes and businesses, creating an economic loss of more than $388 million including vehicles and crop damages. A 500-year flood, an even more catastrophic event, would damage more than 29,000 homes and businesses in addition to vehicles and crops at a cost of $1.9 billion. Hydrologists use terms such as 100-year and 500-year to describe different sizes of catastrophic flooding.

WHAT MAKES THIS INFORMATION NEW?

For most of the Colorado River downstream of Austin, this is the first comprehensive survey of property at risk of flooding. Also, on Lake Travis, the flood study indicates that a 100-year flood would reach a level nearly 6 feet higher than previously thought — 722 feet above mean sea level (ft. msl.) instead of 716 ft. msl. Thus, a 100-year flood would affect about 550 more structures than previously thought.

HOW WILL THE STUDY PARTNERS RESPOND TO THE NEW INFORMATION ABOUT DAMAGE RISKS?

The study partners will evaluate a number of alternatives for reducing the risk or magnitude of flood damages. The possible responses identified so far include:

- Take no action.
- Raise official floodplain levels, which are established by the Federal Emergency Management Agency (FEMA). FEMA works in cooperation with individual communities to study floodplains and remap them according to the most recent data. A FEMA

remapping study is under way in Travis County.

- Buy and remove structures from the floodplains to reduce the potential for damages.
- Modify Mansfield Dam operating rules for releasing floodwaters. This would require action by the Corps of Engineers.
- Construct one or two new reservoirs upstream of Mansfield Dam.
- Implement a combination of one or more of the alternatives.

The Corps of Engineers will examine the consequences of each alternative, including the economic and environmental costs and benefits, and split the study costs with local partners. The partners will help choose the most effective and practical courses of action and seek funding to implement them.

In addition to basin-wide flooding issues, individual communities have specific issues. The Corps of Engineers and LCRA are working with Wharton, Bastrop and Travis counties and the City of Austin on studies to address their particular flood issues.

HOW LONG WILL IT TAKE TO CHOOSE AND CARRY OUT A COURSE OF ACTION?

It will take at least two to three years to assess the costs and benefits of the alternatives. After deciding on a course of action, the partners will need additional time to obtain congressional approval and federal funding for any projects that the solution may involve, and to make any changes involving the Corps of Engineers, FEMA or other federal agencies. Although the risk to life and property and rapid urbanization make quick action vital, determining the best course of action will take time and careful consideration. Each alternative could present substantial and conflicting consequences for basin residents that would need to be addressed.

DOES THIS STUDY AFFECT MY FLOOD INSURANCE OR BUILDING REQUIREMENTS?

The study itself does not change the officially designated 100-year floodplain on FEMA Flood Insurance Rate Maps or local floodplain building ordinances. However, flood officials strongly recommend that property owners take the study results into account when making decisions about structural elevation and flood insurance coverage. Contact your local floodplain administrator to determine whether a particular property is in the 100-year floodplain and to discuss flood protection options. Contact information for local floodplain administrators can be found at www.tceq.state.tx.us/permitting/waterperm/wrpa/fpa.pdf.

If FEMA raises the designated 100-year floodplain, there may be flood insurance rate benefits to property owners in the newly designated floodplain if flood insurance is obtained and maintained prior to the change. For more information about FEMA flood insurance regulations, contact Carl Watts at the FEMA Region VI office, (940) 898-5128, or Diana Herrera with the FEMA National Flood Insurance Program, (281) 829-6880.

WHERE CAN I GET MORE INFORMATION ABOUT THE CORPS OF ENGINEERS STUDY?

Contact Elston Eckhardt, PE of the Corps of Engineers Fort Worth District at (817) 886-1681 or by e-mail at Elston.D.Eckhardt@swf02.usace.army.mil.

WHERE CAN I GET MORE INFORMATION ABOUT THE FEMA FLOODPLAIN MAPPING STUDY OF TRAVIS COUNTY?

Contact Mike Moya or T. Lynn Lovell, project consultants at Halff Associates, at (817) 847-1422 or by e-mail at mmoya@halff.com or llovell@halff.com.

2.2 STREAMS IN MATAGORDA COUNTY AND THE CITIES OF BAY CITY AND PALACIOS

Based on Flood Insurance Study Reports and Flood Insurance Rate Maps published by FEMA the flooding sources and designated Special Flood Hazard Areas (SFHA) in Matagorda County and the cities of Bay City and Palacios are shown below, Figure 13, (from the FEMA Scoping Report, Figure 4 Matagorda County Watersheds).

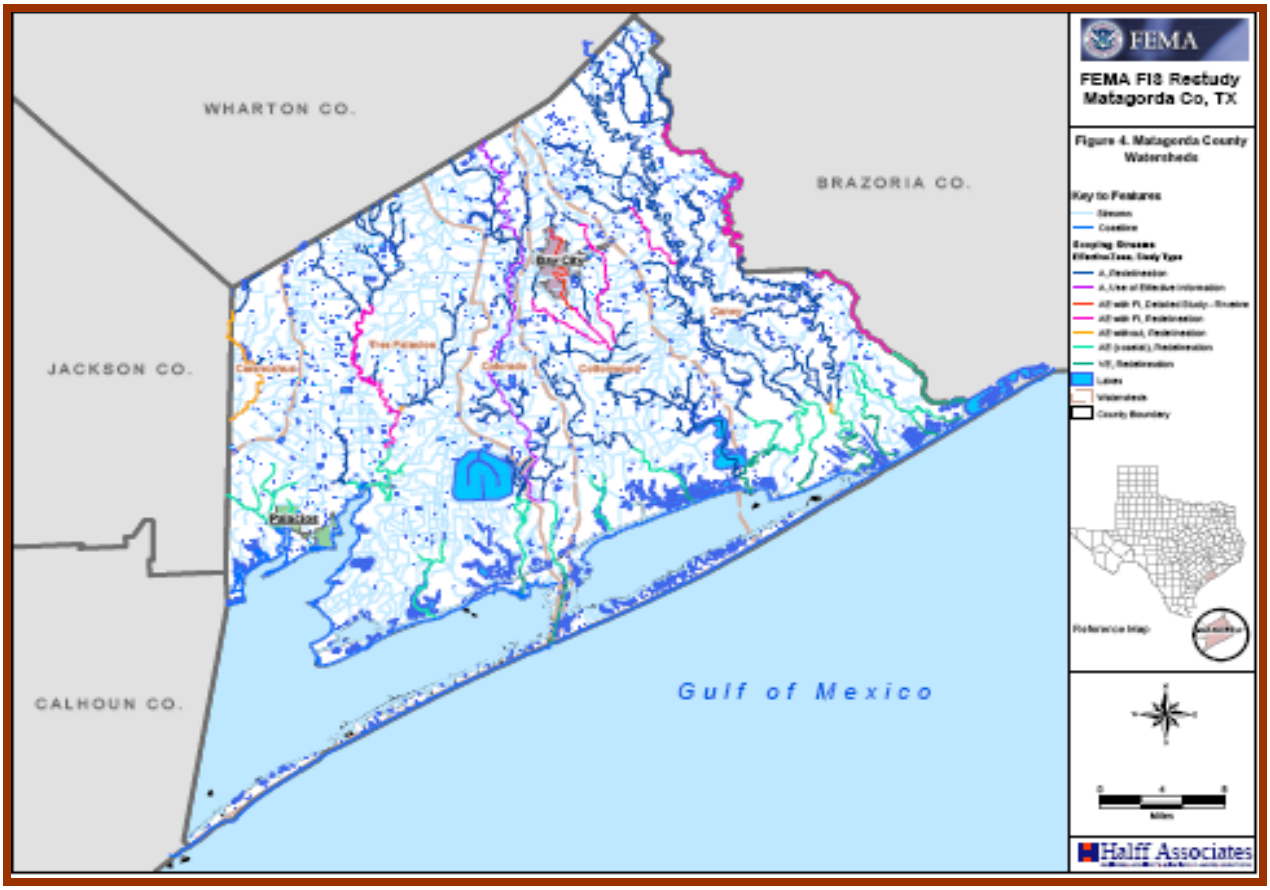
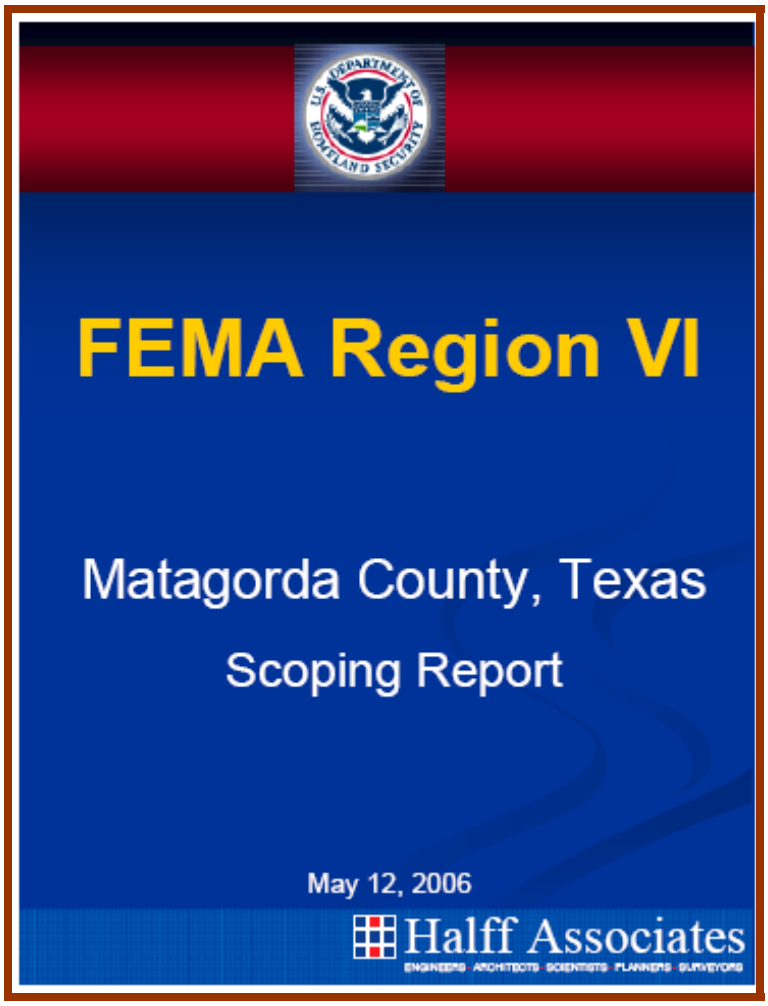


Figure 13: Matagorda County Watersheds (FEMA Scoping Report, Figure 4)

The May 12, 2006 Matagorda County Scoping Study published by FEMA, defined mapping needs that resulted in a countywide remapping effort. The tables that follow summarize the reach

lengths (miles of stream) cross-referenced to FEMA Zones A and AE and coastal lengths (miles) for FEMA Zone VE open coast and interior bays.



Streams with designated Special Flood Hazard Areas are delineated and shown below, from the FEMA Scoping Report, Table 3, Matagorda County Streams.

Table 3: Matagorda County Studied (Zone AE Streams)

	Reach Limits (Miles of Stream)			
Matagorda County Flooding Source by Watershed	Zone VE (Riverine)	Zone AE	Zone A	Total
Caney	33.91	77.02	223.56	334.49
Carancahua	0.00	13.94	5.20	19.14
Colorado	5.10	6.02	89.23	100.35

Matagorda County Flooding Source by Watershed	Reach Limits (Miles of Stream)			
	Zone VE (Riverine)	Zone AE	Zone A	Total
Cottonwood	1.15	44.42	81.13	126.70
Tres Palacios	2.96	70.61	76.65	150.22
Total	**43.12**	**212.01**	**475.77**	**730.90**

Based on Halff Associates' scoping effort the revised stream lengths and coastal lengths are summarized below:

Zone Type	Stream Length (mi.)
Zone A	475.77
Zone AE	212.01
Zone VE (open coast)	67.8

Zone Type	Stream Length (mi.)
Zone VE (interior bays)	122.7

Note: The following streams have flood profiles published in the March 18, 1985 Matagorda County Flood Insurance Study published by FEMA.

Bucks Bayou – Station 000 to Station 60460 = 60,460 feet (11.45 miles)
Cedar Lake Bayou – Station 40750 to Station 91000 = 50,250 feet (9.52 miles)
Cottonwood Creek - Station 000 to Station 63150 = 63,150 feet (11.96 miles)
East Carancahua Creek - Station 10.65 to Station 23.88 = 13.23 miles
Hardeman Slough - Station 1960 to Station 35330 = 33,370 feet (6.32 miles)
Linnville Bayou - Station 35050 to Station 138490 = 103,440 feet (19.59 miles)
Live Oak Creek - Station 000 to Station 36980 = 36,980 feet (7.00 miles)
Tres Palacios River - Station 5000 to Station 144820 = 139,820 feet (26.48 miles)
Total study stream miles with published flood profiles = 105.50 miles

The Colorado River in Matagorda County was studied by the US Army Corps of Engineers Fort Worth District as part of the Lower Colorado River Flood Damage Reduction Study. Matagorda County and the Matagorda County Conservation and Reclamation District provided additional technical and mapping information for the Colorado and Tres Palacios rivers to FEMA to be incorporated into the Matagorda County Remapping Project that was initiated in 2006 and scheduled for completion in 2010 with publication of a revised Matagorda County Flood Insurance Study and FIRMs in digital form. The Colorado River stream miles in Matagorda County is as follows:

	Colorado River Miles	Current Detail Miles	Current Floodway Miles
Matagorda County	48.6	21.2	10.9
Bay City	(1)	(1)	(1)
Palacios	N/A	N/A	N/A

(1) Included in Matagorda County Totals

Nearby Watershed Studies

In July 2006, the TWDB funded (grant and loan) Wharton County to conduct the San Bernard Watershed Study that will identify the floodplain for the San Bernard River and major tributaries within Wharton County.

The San Bernard River is the eastern boundary of Wharton County and the western boundary of Fort Bend County. Fort Bend County has established base flood elevations for the San Bernard River, which will be incorporated into the Wharton County Drainage Master Plan and the San Bernard River Watershed Study. Only 6.7 miles of the San Bernard River in Wharton County is mapped as detail study (Zone AE) on the Wharton County FIRMs. The remainder of the San Bernard River and San Bernard River Tributaries 1, 2, 3, and 4, the Middle Bernard, Middle Bernard Tributary and the West Bernard Creek have not been studied and are currently mapped as Zone A (approximate floodplain) on the Wharton County FIRM. The San Bernard River and major tributaries within Wharton County:

	San Bernard Drainage Area Square Miles	San Bernard River Miles
Brazoria Co.	246.1	43.5
Wharton Co.	290.4	21.9
Ft Bend Co.	176	17.9
Austin Co.	148.2	30.9
Colorado Co.	163	(1)
Total	**1023.7**	**114**

(1) The San Bernard River forms the county boundary between Austin and Colorado counties.

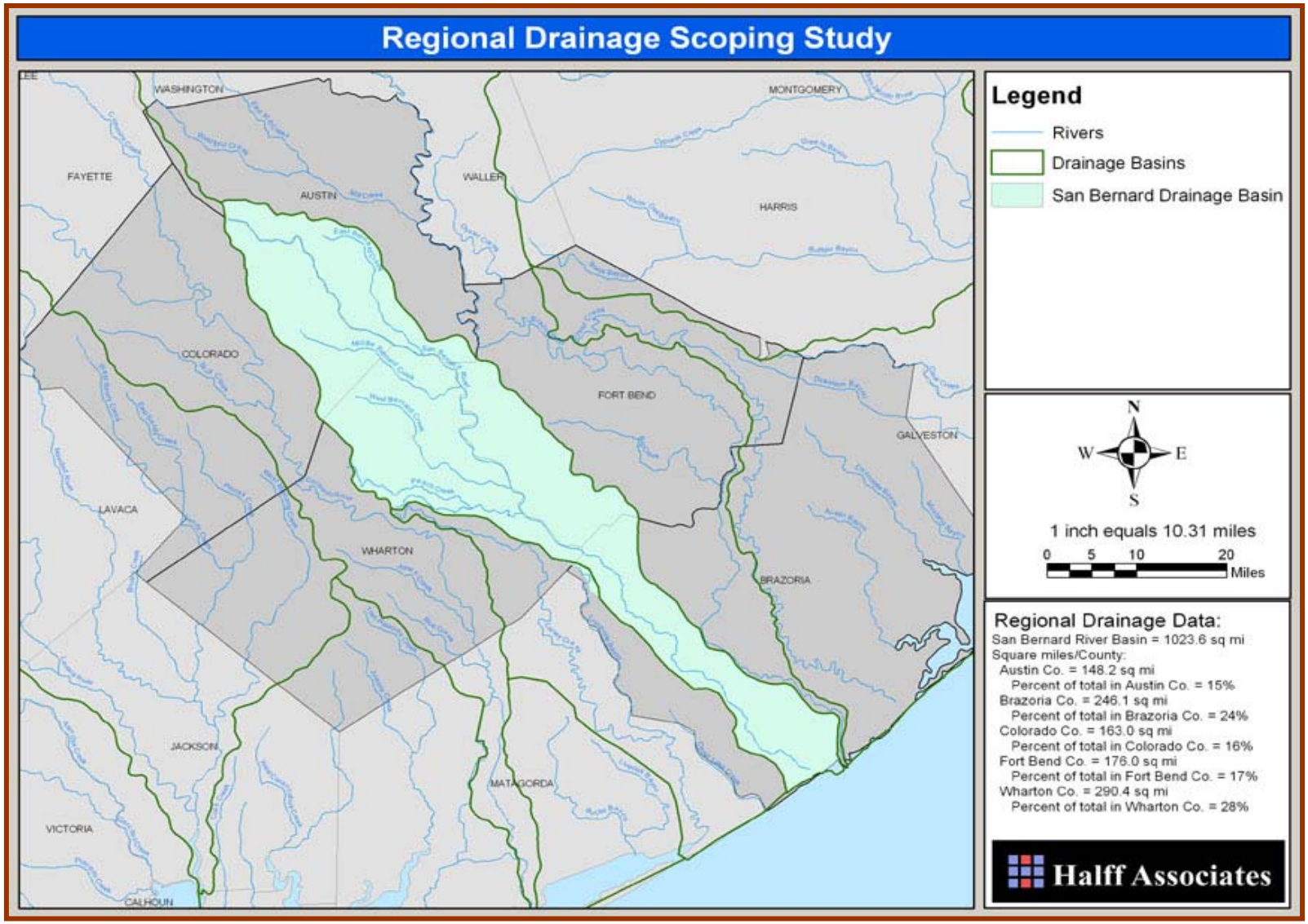


Figure 14: San Bernard River Watershed Study

San Bernard River Study

- Partners
  - Counties: Austin, Colorado, Wharton, Fort Bend, Brazoria
  - Cities: Sealy, Wallis, Kendleton, Sweeny, West Columbia, East Bernard
  - Federal: USACE – 50% project funding; FEMA – Remapping Project
  - State: TWDB – Flood Protection planning grants and loans
- Timeline
  - Determine level of participation of each community
  - Apply for TWDB Grant Fall '05
  - Study was initiated in 2006 after approval of the TWDB Grant
  - Scheduled completion is 2009 (Additional grants are possible)
- Each partner pays their share of
  - Tributaries studied in their county
  - Percentage of main channel study based on shared stream miles
  - Topographic and base mapping
  - Surveying

2.3 LCRA HYDROMET SYSTEM

LCRA's Hydromet site is accessible on line at www.lcra.org and shown in Figure 15. The Hydromet (short for hydrological – meteorological data acquisition system) is a network of gauges that monitor river and weather conditions throughout the lower Colorado River watershed. The gauges provide around-the-clock information on weather conditions, lake levels, streamflows and rainfall.

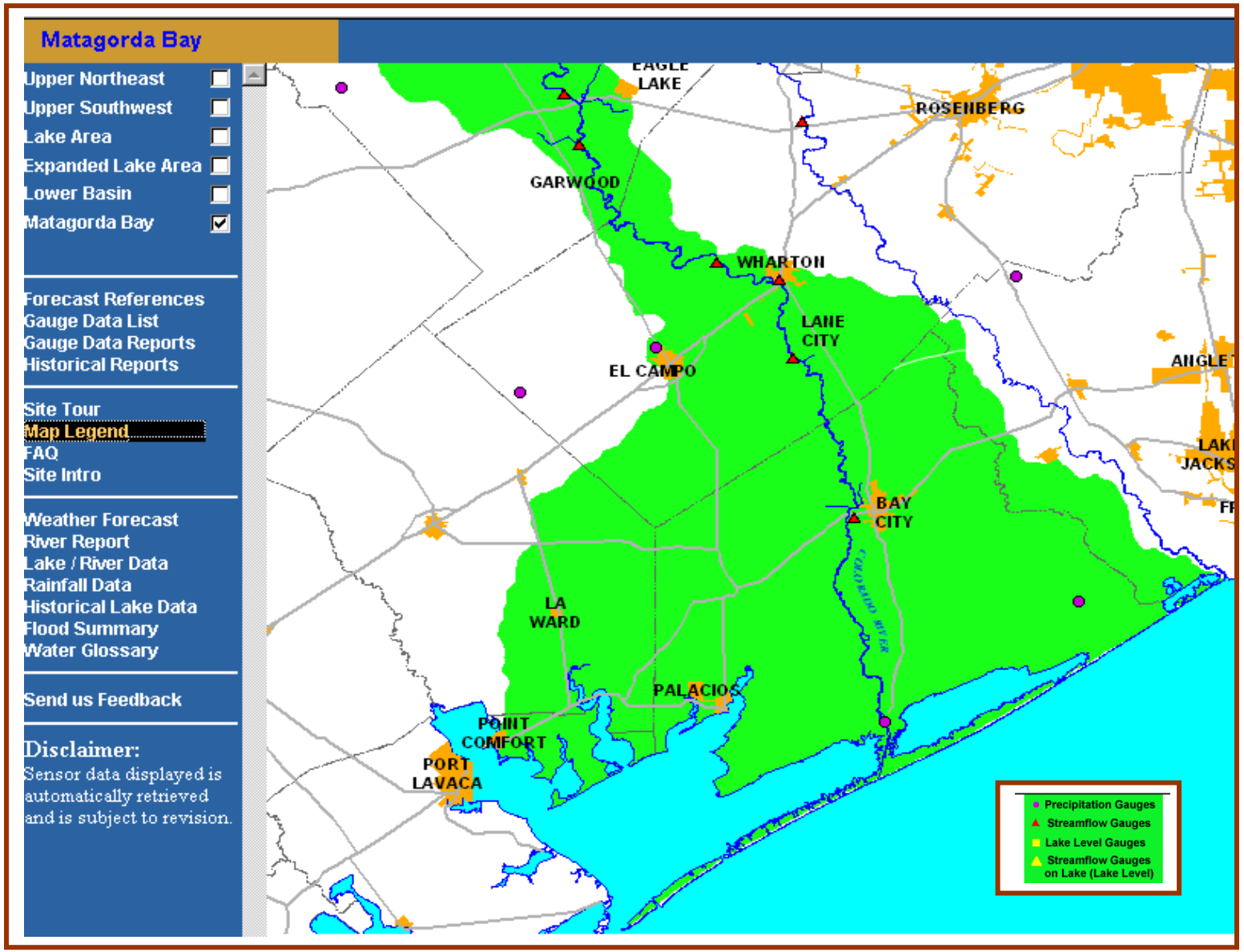


Figure 15: LCRA Hydromet System

The Hydromet plays a crucial role during potential flood situations by enabling LCRA's River Operations Center in Austin to track fast-changing conditions in the lakes, river and major tributaries. The National Weather Service's River Forecast Center in Fort Worth also uses the data to issue flood forecasts.

Disclaimer: LCRA provides the information contained on the Hydromet Web site as a courtesy and service to its customers. To meet as many needs as possible, it offers a wide range of information, including links to other organizations' sites. LCRA tries to provide accurate data according to the resources available. However, all "real-time" data available on LCRA's Web site server is provisional data. It has not been reviewed or edited and is subject to change. As such, LCRA does not warrant or guarantee that the information provided on this site, or any other site to which it is linked, is complete, accurate or current. LCRA shall not be liable under any legal theory, including contract, tort (including negligence and strict liability), warranty, indemnity and contribution theories, for any deficiency in the information accessible on or through this site, including without limitation inaccuracy, untimeliness, errors and omissions.

Five (5) LCRA Precipitation Gauges are located in the Lower Colorado River Basin (Wharton and Matagorda counties) that record precipitation, air temperature and humidity:

- El Campo (located 2 miles NW of El Campo in Wharton County)
- El Campo (located 15 miles WSW of El Campo in Wharton County)
- Eagle Lake (located 7 miles NE of Eagle Lake in Colorado County)
- Matagorda (located at the Town of Matagorda in Matagorda County)
- Sargent (Cedar Lane area in Matagorda County)

Five (5) LCRA Stream flow Gauges located in the Lower Colorado River Basin that record precipitation, stage and flow, air temperature and humidity:

- Colorado River at Lane City (Wharton County)
- Colorado River at Wharton (Wharton County)
- Colorado River at Glen Flora (Wharton County)
- Colorado River near Bay City (Matagorda County)
- Tres Palacios River near Midfield(Matagorda County)

Matagorda County has 1,114 square miles of land area but has only four (4) gages (one gauge per 278 square miles) located within the County (2 streamflow and 2 precipitation gauges).

- The Colorado River has 48.6 stream miles in Matagorda County with 1 stage and flow gauges. The only other stream gauges within Matagorda County is on the Tres Palacios River near Midfield, Texas. Additional stream and precipitation gauges are badly needed in Matagorda County to establish technical data to regulate development, properly size drainage structures and to mitigate future flood losses.

Matagorda County, Texas – Colorado River Gauge near Bay City, Texas:
Hydrologic Unit Code 12090302
Latitude 28°58'26", Longitude 96°00'44" NAD27
Drainage area 42,240 square miles
Contributing drainage area 30,837 square miles
Gauge data available beginning 1947.
Maximum discharge recorded at the Colorado River Gauge was 29,170 cfs in 1957.

Matagorda County, Texas – Tres Palacios River Gauge near Midfield, Texas:
Hydrologic Unit Code 12100401
Latitude 28°55'40", Longitude 96°10'15" NAD27
Drainage area 145 square miles
Contributing drainage area 145 square miles
Gauge datum 5.38 feet above sea level NGVD29
Gauge data available beginning 1969.
Maximum discharge recorded at the Tres Palacios River Gauge was 6,370 cfs in 1982.

The United States Geological Survey (USGS) has near real-time flow data for Colorado River and Tres Palacios River, in Matagorda County, posted on the web at:
http://waterdata.usgs.gov/tx/nwis/current/?type=flow&group_key=basin_cd

New rain gauge in Matagorda County provides weather data
For Immediate Release: October 19, 2007 02:00 PM

MIDFIELD – This community near the Tres Palacios River is the latest link in the network of river and weather gauges operated by the Lower Colorado River Authority to improve flood information and forecasting during floods and storms.

Every 15 minutes, the weather gauge automatically feeds data on precipitation, temperatures and humidity to a central computer in Austin, where hydrologists in LCRA's River Operations Center forecast lake levels and make decisions on operating floodgates at dams.

Bob Watts, emergency management coordinator for Matagorda County, said the gauge will help officials provide early warnings to an increasing number of residents who live along and near the Tres Palacios. “Anytime you get the most current readings it helps us be prepared in case we need to warn people downstream,” Watts said.

The Midfield station is one of 252 gauges in the lower Colorado River basin as part of LCRA’s Hydromet system (short for Hydrometerological Data Acquisition System). The expanding gauge network is designed to improve the organization’s ability to respond when a flood strikes in the lower Colorado River basin -- one of the most flood-prone regions of the United States.

Most of the weather and stream flow gauges are located in the upper parts of the region, along the Highland Lakes and its tributaries, and in the Hill Country, where the basin is widest and flash floods are most common. But the narrow stretches of the lower basin also are subject to

floods, and the Tres Palacios River area is the most flood-prone area of Matagorda County, local officials said.

Matagorda County Judge Nate McDonald said even a moderately heavy rainfall can cause flooding along the Tres Palacios and make some local roads impassable. “I anticipate this will help in giving an early warning to our folks,” McDonald said.

The Midfield gauge represents a cooperative effort between the county and LCRA. Matagorda County officials donated land for the $15,000, battery-operated gauge, which includes a computer and communications equipment to remotely transmit information to a central computer in Austin. The public can monitor the information on the Internet at http://hydromet.lcra.org.

Sean Maijala, LCRA’s supervisor of Hydromet Operations, said the gauge fills a potential gap in the network during heavy rainfalls and fast-moving tropical storms. The information provides another data point that LCRA hydrologists can use during floods as they work to safely release water from the dams that form the Highland Lakes northwest of Austin. “It helps in fine-tuning activity in the lower basin,” Maijala said.

County Commissioner David Woodson, who lives just blocks from the new gauge in the heavily agricultural region, said he sees an additional benefit -- for farmers.

“Instead of driving, farmers who live 30, 40 miles away in El Campo and Louise can get on the Web and see how much rain they got on land they farm in that area,” he said.

2.4 KNOWN FLOOD HAZARDS

Matagorda County is exposed to many hazards; all of which have the potential for disrupting the area, causing damage, and creating casualties. The Matagorda County Emergency Management Plan and the Texas Colorado River Floodplain Coalition (TCRFC) Mitigation Plan identifies the major hazards that Matagorda County is most likely to face. Possible flood related natural hazards include hurricanes and flooding from tropical storms, weather disturbances that are common to the Texas Gulf Coast, and major flood events on the Colorado and Tres Palacios Rivers. There is also the threat of other natural and technological hazards that are described in both the Matagorda County Emergency Management Plan and the Texas Colorado River Floodplain Coalition (TCRFC) Mitigation Plan. Only flood related hazards will be addressed in this Plan. In the 2003-2005 timeframe, the TCRFC Hazard Mitigation Action Plan was prepared by the Texas Colorado River Floodplain Coalition in conjunction with the LCRA to address known hazards throughout the 11 county planning area including Matagorda County. Matagorda County and the cities of Bay City and Palacios participated in the TCRFC planning effort and provided technical information to be included in the TCRFC All Hazards Mitigation Plan. The TCRFC (All Hazards) Mitigation Plan includes the risk assessment, vulnerability analysis and mitigation actions for the many hazards that impact Matagorda County. These documents were reviewed by the Matagorda County Flood Mitigation Planning Committee as part of the planning effort for the Matagorda County Flood Mitigation Plan.

The Matagorda County Flood Mitigation Plan outlines mitigation goals, identifies risk reduction strategies for flood hazards that threaten the area, and discusses the ongoing risk reduction activities undertaken within each participating community. The Flood Mitigation Plan further details what is to be done, how much it will cost, who will be responsible for flood mitigation actions, how each action will be funded and provides an implementation schedule. The flood mitigation actions described in the Matagorda County Flood Mitigation Plan will supplement both the Hazard Mitigation Annex (Annex P) to the Matagorda County Emergency Management Plan and the TCRFC (all hazards) Mitigation Plan. .

Matagorda County recognizes that the County will continue to be exposed to and subject to the impact of hazards. Furthermore, it is possible for a major disaster to occur at any time and at any place. In many cases dissemination of warning to the public and implementation of increased readiness measures may be possible. Still, some emergency situations occur with little or no warning. The following paragraphs identify many of the flood related hazards that Matagorda County may potentially encounter.

The following is a description of flood hazard from the North Central Texas Council of Governments (NCTCOG) Regional Risk Assessment and posted on line at www.nctcog.org:

Flooding is defined as the accumulation of water within a water body and the overflow of excess water onto adjacent floodplain lands. The floodplain is the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding.

The statistical meaning of terms like “25-year storm” and “100-year flood” can be confusing. Simply stated, a floodplain can be located anywhere; it just depends on how large and how often a flood event occurs. Floodplains are those areas that are subject to inundation from flooding. Floods and the floodplains associated with them are often described in terms of the percent chance of a flood event happening in any given year. As a community management or planning term, “floodplain” most often refers to an area that is subject to inundation by a flood that has a one percent chance of occurring in any given year (commonly and incorrectly referred to as the 100-year floodplain).

What Is a 100-Year or 1% Chance Flood?

Floods are random, variable events. Hydrologists characterize them as 50-year, 100-year, or 500-year floods. What exactly is a “100-year flood”? It is a flood that has a one-percent chance of being equaled or exceeded in any given year.

A young Missouri farmer has provided an ingenious explanation of the possibility of experiencing a 100-year flood. He described a bag full of 100 marbles with 99 clear marbles and one black marble. Every time you pull one of those marbles out and it's black, you've got a 100-year flood. After each draw, you put the marble back in the bag and shake it up. It's possible, although not likely, that you could pull the black one out two or even three times in a row.

A 100-year flood has a 26 percent chance of occurring over the life of a 30-year mortgage and a 63

percent chance of occurring over the next 100 years. No one, especially those living in high-risk floodplains, should be misled into believing that a 100-year flood occurs only once in a century. In addition, although the 100-year flood is usually the only type people hear about, flood events of all sizes can also occur.

As commonly applied, the concept of a 100-year floodplain can be misleading. Technically, only the outer edge of a 100-year floodplain has a risk of one percent of being flooded in any given year. The risk rises for sites closer to the river, and also at lower elevations, yet many people think of the entire area between the water body and the outer edge of the 100-year floodplain as subject to the same risk. This risk variability is not usually shown on floodplain maps. It should be kept in mind that mapping floodplain boundaries is at best an imperfect science.

According to the Federal Interagency Floodplain Management Task Force, flooding in the United States can be separated into several types:

Riverine Flooding

Includes overflow from a river channel, flash floods, alluvial fan floods, and ice jam floods. Overbank flooding of rivers and streams is the most common type of flood event. Flooding in large rivers usually results from large-scale weather systems generating prolonged rainfall over wide areas. These same weather systems can cause flooding in smaller basins that drain to major rivers.

Flash Floods

Flash floods are characterized by a rapid rise in water level, high velocity and large amounts of debris. Major factors in flash flooding are the intensity and duration of rainfall and the steepness of watershed and stream gradients. The amount of watershed vegetation, the natural and artificial flood storage areas and the configuration of the streambed and floodplain are also factors. Flash floods may also result from the failure of a dam or the sudden breakup of an ice jam. They are capable of tearing out trees, undermining buildings and bridges and scouring new channels.

Local Drainage Problems and High Groundwater Levels

Can be caused by heavy local precipitation flooding areas other than delineated floodplains or along recognizable drainage channels. If local conditions cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding problems. Flooding of this nature generally occur in areas with flat gradients, and generally increase with urbanization which speeds the accumulation of floodwaters because of impervious areas.

Flooding occurs in all 50 States. FEMA indicates that the States with the most land area subject to flooding are Texas, Louisiana, Florida, and Arkansas. Since 1965, 30 Presidential Disaster Declarations have been declared in Texas. Of these 30 declarations, many have been declared in the Matagorda County area.

In any given year, damaging floods are likely to occur on at least one major river or stream in Texas, affecting thousands of homes and businesses, and often, resulting in the loss of life. Floods in Texas killed more people between 1989 and 1998 than in any other state—145 out of a national total of 957 people killed in floods. On the average, Texas suffers $254 million in losses (direct crop and property damage) each year from flooding.

Thunderstorms are a frequent occurrence within Matagorda County. They may occur year round; however, the peak season is in the spring of each year. They occur most often between the hours of noon and 10:00 PM. Thunderstorms may be associated with lightning, hail, tornado, and flash flooding conditions. These storms are also capable of producing straight-line winds and microburst with extreme power. Thunderstorms kill more people in the United States than any other phenomenon.

The heavy rains associated with thunderstorms and coastal storms often cause flash flooding. Due to the flat terrain, flash flooding in Matagorda County renders roadways impassable. Flash flooding events at times cause waters to rise to the point of impacting businesses and residences. In the aftermath of thunderstorm activity, it is not uncommon to find floodwaters in businesses and homes.

Lightning is a secondary effect of electrification within a thunderstorm cloud system. Lightning damage results from four effects of the lightning strike: electrocution of humans and animals; vaporization of materials along the path of the strike; fire caused by the high temperature produced by the strike; and a sudden power surge that can damage electrical and electronic equipment. Millions of dollars of direct and indirect damages result from lightning strikes on electric utility substations and distribution lines. While property damage is the major hazard associated with lightning, it should be noted that lightning strikes kill more people each year than either tornadoes or hurricanes.

Hurricanes and tropical storms combine size and intensity to become one of Earth’s greatest and most awesome weather vehicles of death and destruction. In addition to hurricanes and tropical storms, damage may be caused by tornadoes that are created from the storms. The Texas coast is not immune from damages from such storms. Hurricane season lasts over a six-month period from June 1 to November 30. Most hurricanes occur in August, September, and October.

Hurricanes are tropical cyclones in which winds reach constant speeds of 74 miles per hour or more and blow in a large spiral around a relatively calm center. Hurricanes are essentially giant whirlwinds in which air moves in a large tightening spiral around a center of extreme low pressure. Near the center, hurricane winds may gust to more than 200 miles per hour.

While hurricane winds are responsible for much of the damage, the storm surge and torrential rains accompanying hurricane landfall are responsible for most deaths. Historically, drowning has been the greatest cause of hurricane deaths. The storm surge raises wave heights and increases tides. Torrential rains because both flash flooding and sustained flooding in the area.

Coastal Surge and Erosion

Matagorda County has 67.8 miles of shoreline fronting on the Gulf of Mexico and 122.7 miles of shoreline fronting on Matagorda Bay all subject to coastal storm surge and erosion. Areas along the Texas Coast have a thirty-seven percent (37%) chance of a hurricane, extreme hurricane or tropical storm occurring in any given year. A listing of Hurricanes and Tropical Storms that have impacted Matagorda County and the Texas Gulf Coast may be found in the Introduction/History of Flooding Section of this Plan.

Tropical storms are weather events similar to hurricanes with sustained winds in these storms between thirty-nine (39) and seventy-three (73) miles per hour. Tropical storms can affect an area by dropping large amounts of rain over a sustained period of time. Again, flash flooding and sustained flooding are the most deadly aspects of tropical storms.

Matagorda County participates in annual training exercises related to hurricane/tropical storm events. Representatives from Matagorda County participate in the annual State Hurricane Exercise for Gulf Coast Communities conducted by the TDEM.

The Bureau of Economic Geology June 2000 Final Report, *Coastal Hazards Atlas of Texas: A Tool for Hurricane Preparedness and Coastal Management – Volume 1 The Southeast Coast,* includes the report's Figure 3 (Figure 16 below) that describes the shoreline change from Sabine Pass to the Brazos River.

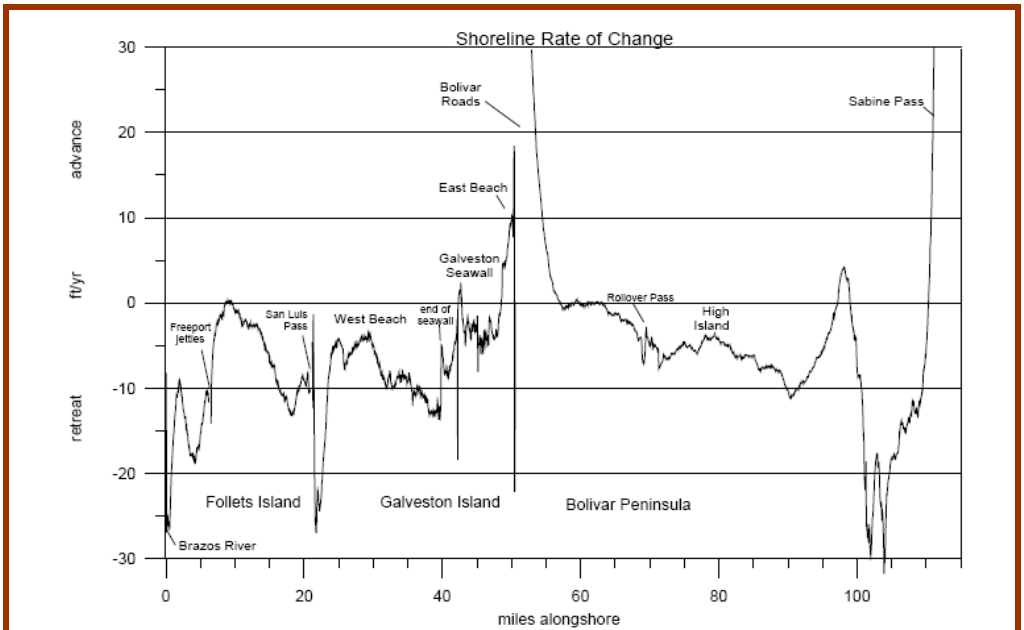


Figure 16: Shoreline Change from Sabine Pass to the Brazos River

The Texas General Land Office (GLO) has monitored erosion all along the Texas Gulf Coast and the erosion rate in Texas Coastal Region III, that includes the 42.1 miles of Matagorda Peninsula

frontage on the Gulf Coast varies from -24.8 feet per year at the Matagorda/Brazoria County boundary to -1.8 feet per year at Sargent Beach to -14.6 feet per year at the mouth of Matagorda Bay.

Sea Level Rise

Sea Level Rise has been an ongoing problem on the Texas Gulf Coast. As recorded in the Bureau of Economic Geology June 2000 Final Report, *Coastal Hazards Atlas of Texas: A Tool for Hurricane Preparedness and Coastal management – Volume 1 The Southeast Coast*, the upper Texas coast has a rate of relative sea-level rise of 0.022 ft/yr (about 1 foot in 46 years) as measured by the Pier 21 tide gauge on Galveston Island. Figure 2 (Figure 17 below), from the Bureau of Economic Geology Report, *Monthly average sea level since 1909 as measured by the Pier 21 gauge in Galveston Bay*. Straight line is a lineal regression through all the data points.

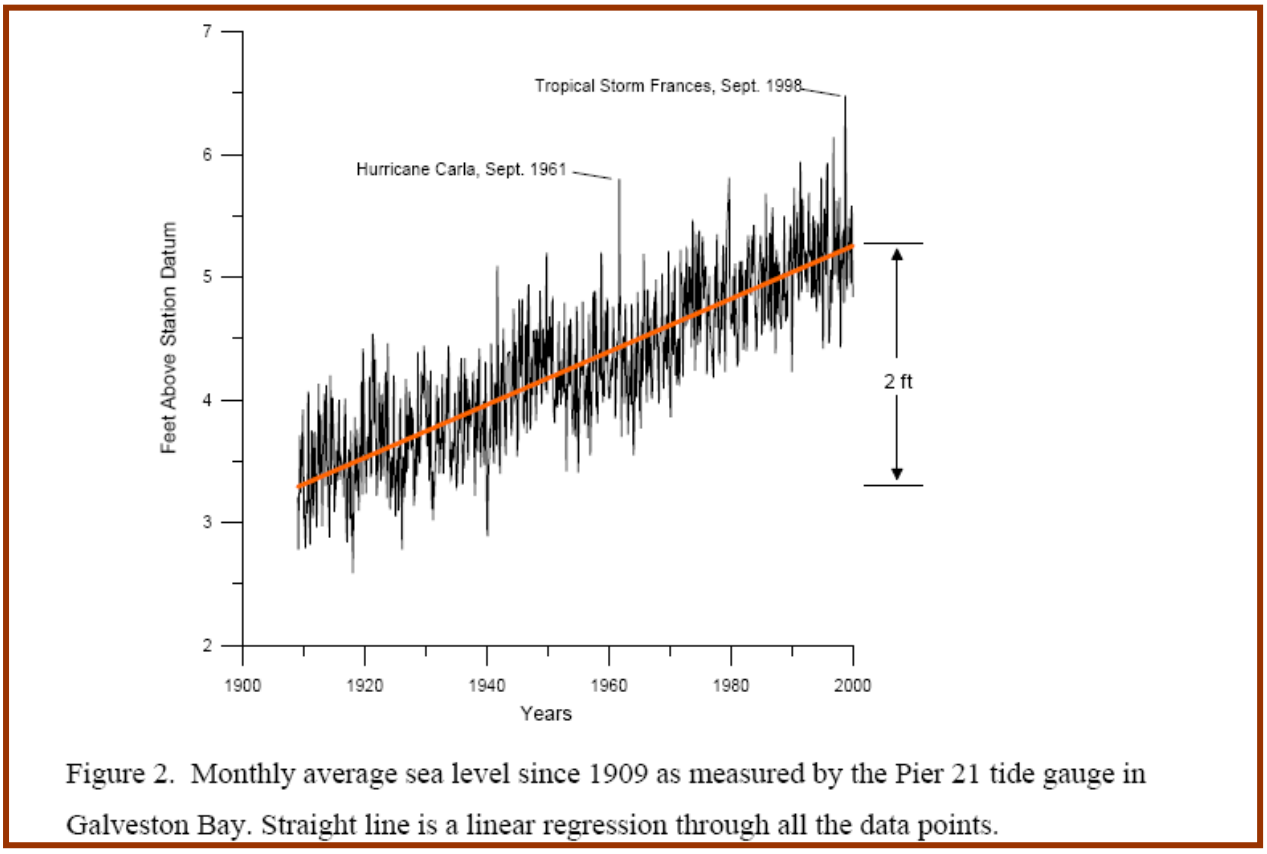


Figure 2. Monthly average sea level since 1909 as measured by the Pier 21 tide gauge in Galveston Bay. Straight line is a linear regression through all the data points.

Figure 17: Monthly Average Sea Level Since 1909

On April 23, 2009, the Heinz Institute published *Resilient Coasts: A Blueprint for Action* and listed the following recommendations on coastal policy:

- Enabling planning for climate impacts by providing the necessary science and decision-making tools;
- Requiring risk-based land use planning;
- Designing adaptable infrastructure and building code standards to meet future risk;

- Strengthening ecosystems as part of a risk mitigation strategy;
- Developing flexible adaptation plans;
- Maintaining a viable private property and casualty insurance market;
- Integrating climate change impacts into due diligence for investment and lending

The publication's Figure B-6 (Figure 18 below) "Magnitude and confidence limits of trends for Florida Keys and Gulf of Mexico coast National Ocean Service (NOS) tide stations", is from the US Army Corps of Engineers Circular No. 1165-2-211, dated July 1, 2009, establishing water resource policies and authorities incorporating sea-level change considerations in Civil Works projects. Climate research by the Intergovernmental Panel on Climate Change (IPCC) predicts continued and accelerated global warming for the 21 Century and possibly beyond, which will cause a continued or accelerated rise in global sea level. Impacts to coastal and estuarine zones caused by sea-level change must be considered in all phases of Civil Works programs.

The Circular provides USACE guidance for incorporating the direct and indirect effects of projected future sea-level change in managing, planning, engineering, design, constructing, operating and maintaining USACE projects and systems of projects.

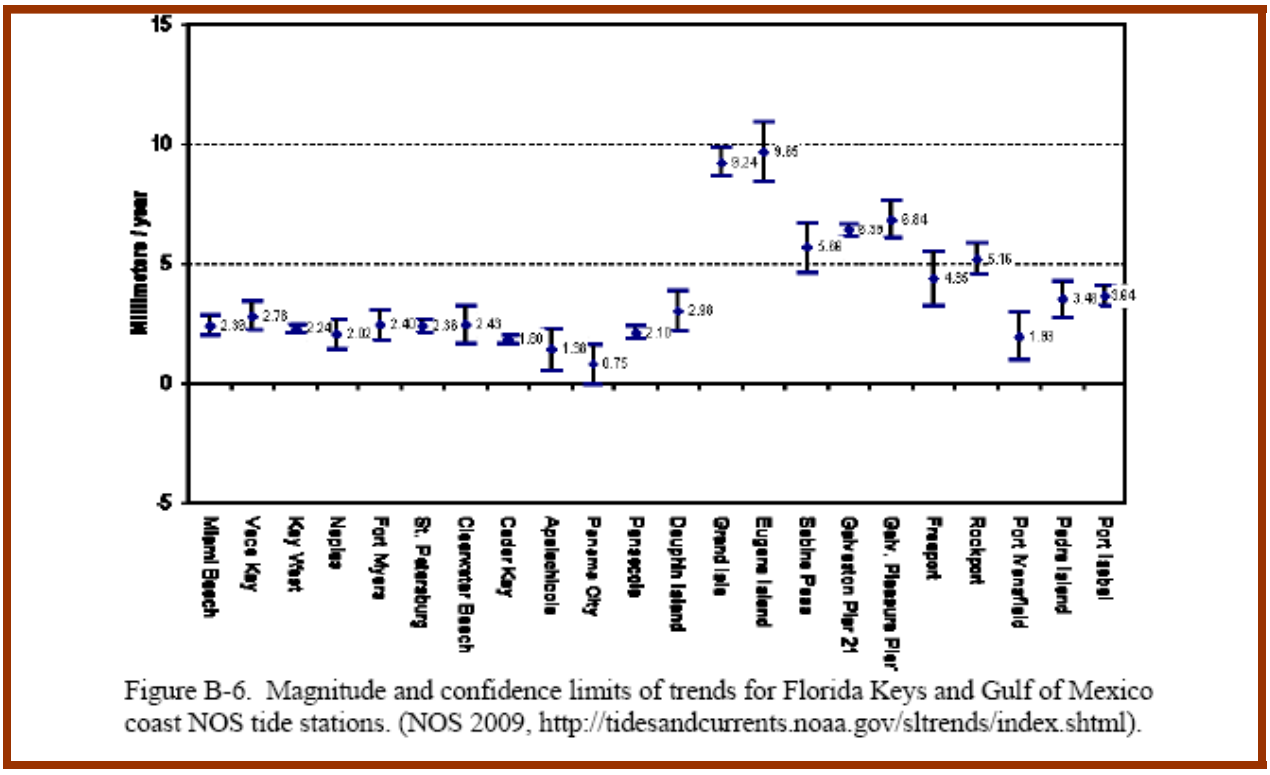


Figure B-6. Magnitude and confidence limits of trends for Florida Keys and Gulf of Mexico coast NOS tide stations. (NOS 2009, http://tidesandcurrents.noaa.gov/sltrends/index.shtml).

Figure 18: Magnitude and Confidence Limits of Trends

Galveston Pier 21 is shown as +6.39 mm/year (0.0210 feet/year) sera-level rise which basically agrees with Figure 17, referenced earlier in this section, from the Bureau of Economic Geology Report, *Monthly average sea level since 1909 as measured by the Pier 21 gauge in Galveston Bay* that measured 2 feet of sea-level rise from 1909 to 1998.

Subsidence

Based on the LCRA San Antonio Water System (SAWS) Final Report, Incorporation of Subsidence Modules into the Interim LCRA-SAWS Water Project (LSWP) Model, dated April 2007, subsidence has been recorded in Matagorda County. Subsidence can be a major contributor to flood hazards therefore the following information from the LCRA Report was reviewed by the Matagorda County Flood Mitigation Planning Committee and included in this report.

Land-surface subsidence is the lowering or sinking of the land surface in response to removal of subsurface support. Land-surface subsidence is caused both by natural compression of subsurface earth materials and anthropogenic withdrawals of subsurface fluids, gases, and minerals (groundwater, oil, gas, coals, sulfur, and salt). For the LSWP study area, this report discusses the major factors and processes responsible for land-surface subsidence, provides estimated values of land-surface subsidence, and explains how the LSWP interim groundwater model has been modified to simulate subsidence. Since 1900, the land-surface subsidence in Colorado, Wharton, and Matagorda Counties is estimated to be less than 1 ft. This estimate is based on field measurements and modeling results from the LSWP model and the Northern Gulf Coast Groundwater Availability Model. In areas where land-surface subsidence exceeds 1 ft, the higher subsidence values are attributed to gas/petroleum exploration and sulfur mining.

Because of the work of the Harris Galveston Subsidence District (HGSD) and the Fort Bend Subsidence District (FBSD), which was created by the Texas Legislature in 1989, a well-established monitoring program exists for measuring land-surface subsidence in Brazoria, Fort Bend, and Harris Counties (Zilkoski et al, undated). Collective studies by the Harris-Galveston Coastal Subsidence District (HGSCD), the FBSD, and the National Geodetic Survey (NGS) have produced useful information for developing and verifying models for predicting subsidence near Harris County.

To collect subsidence information for calibrating the LSWP model in the vicinity of the LCRA irrigation districts, the LSWP groundwater team examined land-surface subsidence literature from the TWDB, University of Texas at Austin – Bureau of Economic Geology (BEG), the USGS, the HGSD, and the NGS. The team's general consensus is that there is relatively little data available in the vicinity of LCRA's irrigation divisions in Colorado, Wharton, and Matagorda Counties. This lack of findings has been confirmed by personal conversations with NGS staff (2007).

From the available reports discussed later in this report, it can be concluded that the magnitude of land-surface subsidence in the study area (at the regional level) is generally minimal (less than 0.5 ft) and certainly not of the magnitude that has been observed in Harris and Galveston Counties over the last century. However, on the basis of the limited data, relationships between subsidence and the decline of groundwater levels have been established, and these relationships appear similar to the relationships responsible for land-surface subsidence in Harris County. One of these relationships is that the amount of land-surface subsidence is directly related to the clay content of the geologic substrate being developed for groundwater and total drawdown. In Harris County, for example, a rule-of-thumb is that for a 100-ft decline in groundwater level, the

resulting subsidence is between 0.5 and 1.3 ft (Gabrysch, 1967). Another of these relationships is that on a regional scale, groundwater withdrawal is the primary cause of land-surface subsidence; on a localized scale, the dominant mechanism for land-surface subsidence could be petroleum exploration.

- In Matagorda County (Hammond, 1969), the amount of subsidence has been calculated by comparing elevations of benchmarks in a generally northeast trending line during the period from 1918 to 1951. As shown on the report's Figures 3.4 and 3.5 (Figures 19 and 20 following), there appears to be localized subsidence in Matagorda and Brazoria Counties. The maximum magnitude of subsidence occurred along the Matagorda-Brazoria county line and amounted to about 0.26 ft. The average amount of subsidence was approximately 0.10 ft for the area measured. Hammond (1969) generally has assessed the ratio of subsidence to water level decline to be approximately 1:124.
- In a comprehensive overview of subsidence data up to 1973 in the Texas coastal areas, Ratzlaff (1982) stated that overall subsidence in Matagorda, Wharton, and surrounding counties was generally less than 0.5 ft. However, there was a localized occurrence greater than 1.5 ft in the vicinity of the Francitas North/Midfield/Blessing Oilfields complex in southeast Jackson and northwest Matagorda Counties. The cause for this subsidence was groundwater withdrawal associated with oil and gas production in the area. Although no information is presented for Wharton County, a reasonable assumption is that the 0.5-ft contours in eastern Jackson County continue into and include the western portion of Wharton County.

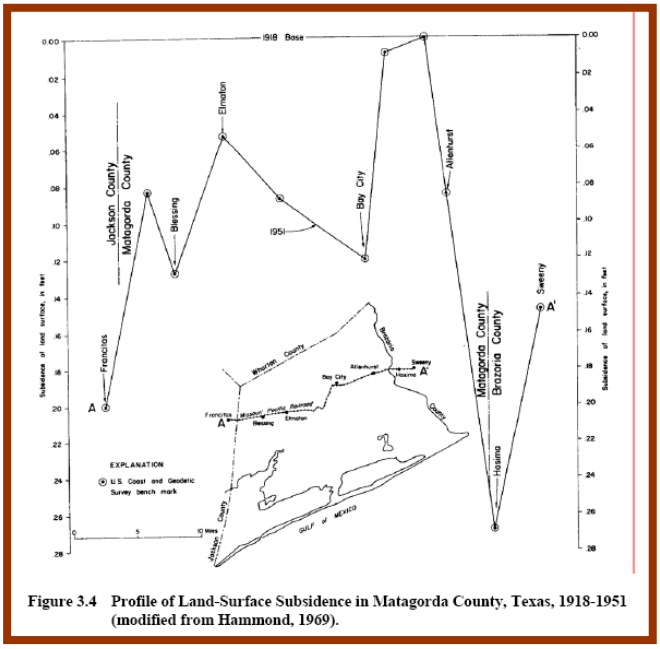


Figure 3.4 Profile of Land-Surface Subsidence in Matagorda County, Texas, 1918-1951 (modified from Hammond, 1969).

Figure 19: Profile of Land-Surface Subsidence in Matagorda County, Texas

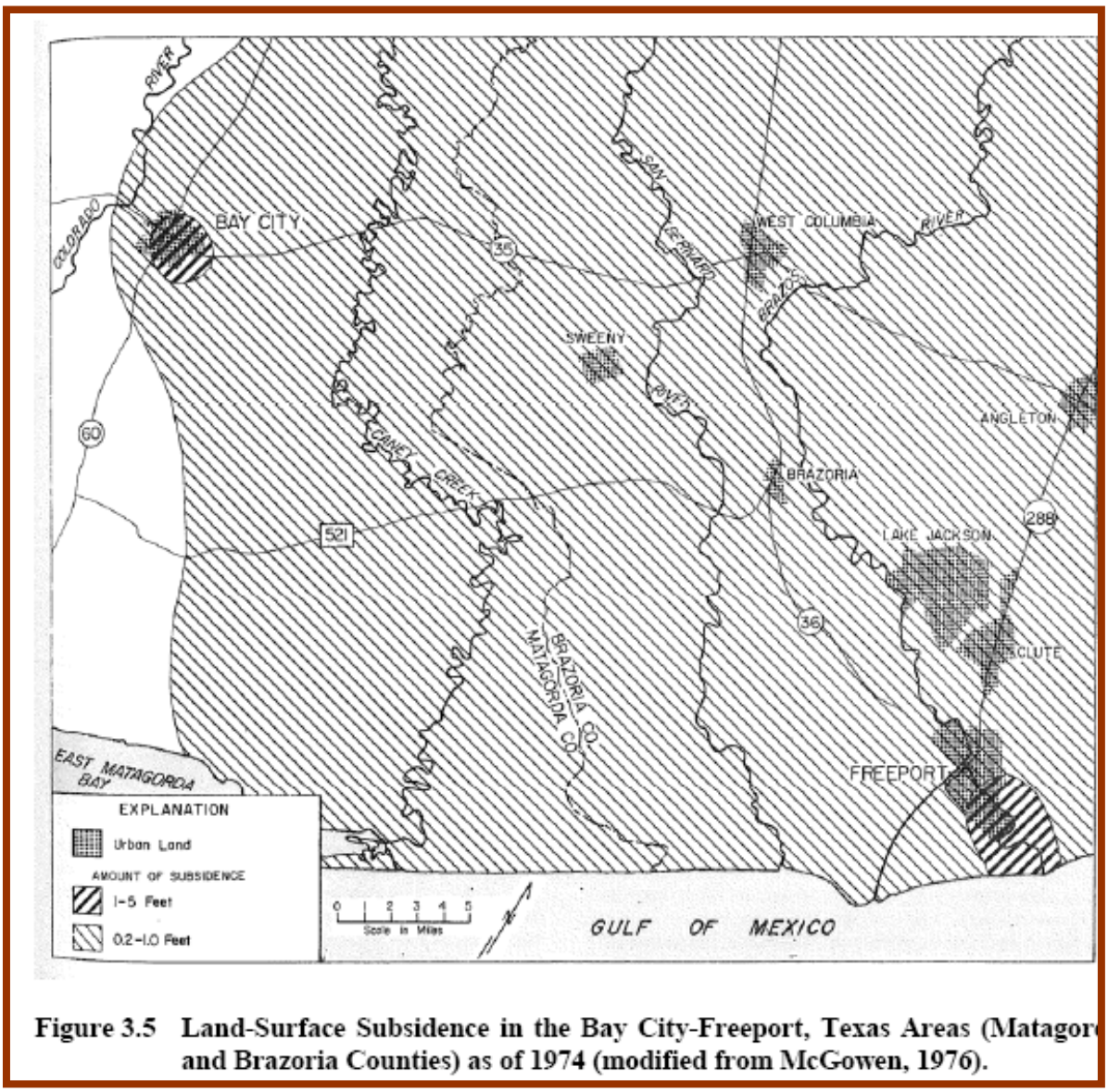


Figure 3.5 Land-Surface Subsidence in the Bay City-Freeport, Texas Areas (Matagor and Brazoria Counties) as of 1974 (modified from McGowen, 1976).

Figure 20: Land-Surface Subsidence in the Bay City-Freeport, Texas Areas

2.5 HISTORICAL FLOOD EVENTS

As listed in the TDEM Hazards Analysis, historically floods are and continue to be one of the most frequent destructive and costly natural hazards. Floods are a natural and recurrent event. Floods take place every year and in all seasons. Flooding events are usually broken into three different categories: flash floods, riverine floods, and tidal floods. Given the present knowledge, the size, time and place of floods cannot be predicted more than a few hours in advance.

The following are major tropical storm and hurricane events, which have produced severe flooding and structural damage along the Texas Gulf Coast. Several of the storms identified resulted in damages within Matagorda County:

- September 16-20, 1854
- June 1-5, 1871
- June 8-10, 1871
- September 8-18, 1875
- August 19-24, 1879
- June 21-25, 1880
- June 13-15, 1886
- June 18-16, 1888
- July 4-6, 1888
- July 3-8, 1891
- October 2-7, 1895
- September 10-13, 1897
- September 20-28, 1898
- September 7-10, 1900, "Galveston Great Storm"
- July 21, 1909
- August 16-17, 1915
- September 14, 1919
- August 12-15, 1932
- July 21-27, 1933
- August 26 – September 1, 1934
- October 11-17, 1938
- September 19-25, 1940
- September 11-16, 1941
- September 16-25, 1941
- August 30, 1942
- July 25-29, 1943
- August 24-29, 1945
- August 15-27, 1947
- September 27 – October 26, 1949
- July 27, 1957 – Hurricane Audrey
- July 24-25, 1959 – Hurricane Debra
- September 11, 1961 – Hurricane Carla
- September 16, 1963 – Hurricane Cindy
- August 6, 1964 – Tropical Storm Abby
- August 2-5, 1970 – Hurricane Celia
- September 12-17, 1970 – Tropical Storm Felice
- September 1-7, 1973 – Tropical Storm Delia
- July 25, 1979 – Tropical Storm Claudette
- August 30, 1979 – Tropical Storm Elena
- August 3-10, 1980 – Hurricane Allen
- September 4-7, 1980 – Tropical Storm Danielle
- August 15-18, 1983 – Hurricane Alicia
- June 23, 1986 – Hurricane Bonnie
- October 15-20, 1994 - Southeast Texas Flood
- August 21, 1998 - Tropical Storm Charley
- September 1998 – Tropical Storm Frances
- June 5-10, 2001 – Tropical Storm Allison
- September 5-7, 2002 – Tropical Storm Fay
- July 14-16, 2003 – Hurricane Claudette
- September 2003 – Tropical Storm Grace
- August 2005 – Hurricane Rita
- September 2008 – Hurricane Ike

Detailed information relating to hurricanes, tropical storms, and flash flooding events was gathered from the National Climactic Data Center (NCDC), a division of National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service (NWS).

2.6 ELEVATION REFERENCE MARKS

Matagorda County is currently being remapped by FEMA and publication of the Matagorda County (countywide) FIRMs is scheduled for in 2010.

During the 2006 scoping meeting for the FEMA Matagorda County remapping effort, the County recognized that the existing Elevation Reference Marks (ERMs), shown on the Matagorda County and cities of Bay City and Palacios FIRMs, were established in the late 1970's and early 1980's and are no longer usable for floodplain management purposes. Many of the 1970's and 1980's ERMS had been destroyed and all are referenced to North Geodetic Vertical Datum (NGVD) 1929. To add to this problem the 1970-80's benchmarks had not been releveled or adjusted to the National American Vertical Datum (NAVD) of 1988, which is the new national elevation standard that complies with the latest FEMA mapping and elevation specifications. The new Matagorda County FIRMs will only identify ERMs that are maintained in the NGS database accessible online at www.ngs.noaa.gov. The reduced number of reliable elevation reference marks, identified in Matagorda County, creates floodplain management problems for Matagorda County and the cities of Bay City and Palacios. To comply with NFIP minimum requirements, communities must require that new and substantially improved construction, within designated Special Flood Hazard Areas, to be properly elevated so the lowest floor is at or above the base flood elevation and referenced to NAVD 1988. With a reduced number of NAVD 1988 Elevation Reference Marks available, each community must require developers or homeowners that are requesting building permits, to provide elevation certificates or elevation data based on NAVD 1988 or derived from an acceptable conversion from NGVD 1929 to NAVD 1988 to support the permit application.

The Matagorda County Flood Mitigation Planning Committee evaluated the ERM coverage throughout the County to identify areas where additional ERMS are needed for floodplain management purposes.

Currently there are three hundred forty seven (347) NGS benchmarks identified within the cities of Bay City and Palacios and within the unincorporated areas in Matagorda County referenced on the NGS website.

The Matagorda County Flood Mitigation Committee evaluated the 347 NGS benchmarks and found that 143 (41%) are designated as destroyed or "not found" by the NGS. Therefore there are only one hundred seventy-seven (177) usable NGS benchmarks in Matagorda County. Therefore the bench mark density for Matagorda County is only 0.16 NGS marks per square mile and bench marks are mostly located along highway and railroad routes with few located within designated flood prone areas where needed.

The Committee recommends that a minimum of 2 permanent ERMS per mile are needed in areas with detail study streams to provide elevation references needed for floodplain management.

The LCRA has established a Global Position Surveying (GPS) Base Station on the Matagorda County Annex Building located at 2200 7th Street in Bay City and a High Accuracy Reference Network (HARN) of elevation reference marks that have been referenced to NAVD 1988. A

total of thirty (30) HARN marks have been established in Matagorda County. Nine (9) of the LCRA HARN marks are also NGS monuments and all have either brass or aluminum disks. The LCRA HARN is accessible on line at www.lcra.org.

The LCRA Sub-HARN an interactive website to access a network of sub-HARN quality GPS control marks. This survey control network is being utilized by private surveyors, city, county and state government agencies to improve positional accuracy of surveyed components.

There are two options for accessing the LCRA HARN points; either search by text (by ID, County, Quad) or an interactive map.

The Texas Department of Transportation (TxDOT) will complete installation of a GPS Base Station in late 2009 located at the Yoakum District Area Office in Wharton, Texas that will accessible by local surveyors.

As a byproduct of the Matagorda County Flood Mitigation Plan, Halff Associates compiled a Matagorda County NAVD 1988 Bench Mark Network that includes:

- NGS Bench Marks based on NAVD 1988
- LCRA HARN Bench Marks
- Bench marks established by the Matagorda County Conservation and Reclamation District in 2009 to support the Matagorda County Flood Mitigation Plan.
- LCRA HARN Marks

Texas Department of Transportation bench marks are located throughout the TxDOT highway network in Matagorda County and bench mark location and elevation information is available from:

Mark Woolridge, PE Area Engineer
Texas Department of Transportation Wharton Area Office:
1512 FM 102
Wharton, Texas 77488

In June 2009, the Matagorda County Conservation and Reclamation District installed five (5) new elevation bench marks in Matagorda County to support the Matagorda County Flood Mitigation Plan. Individual Bench Mark Fact Sheets are included in Attachment B.

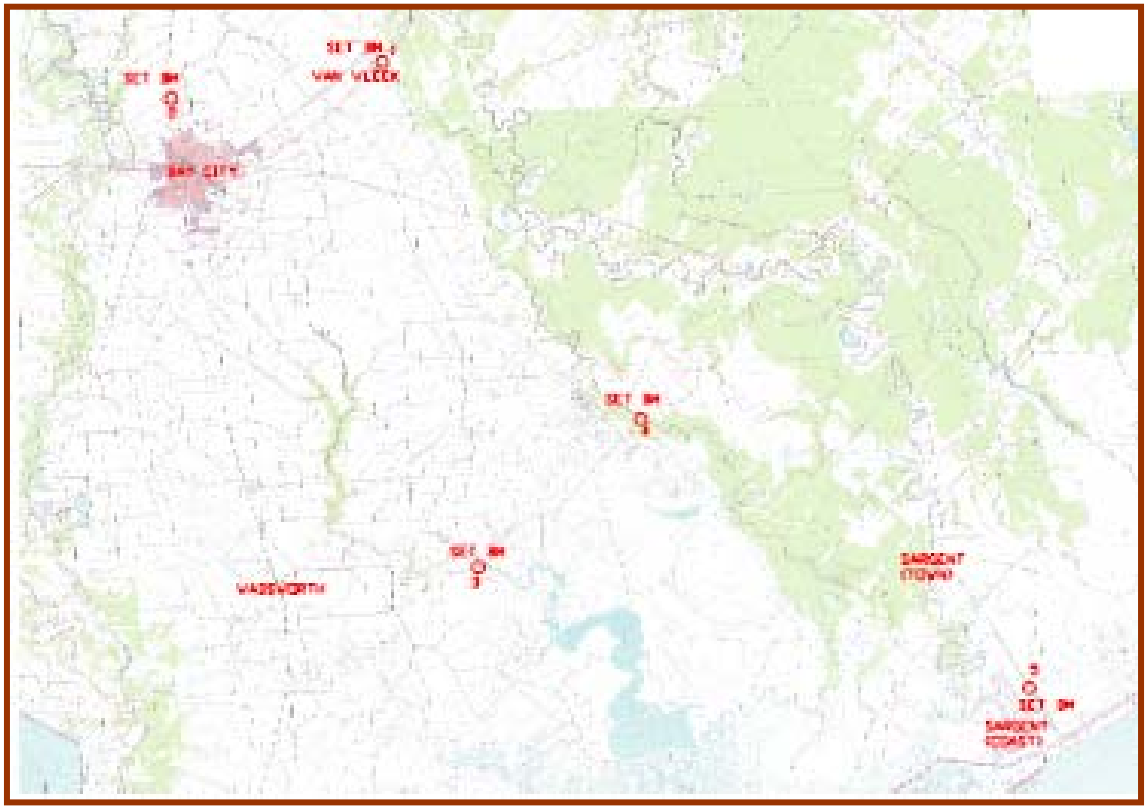


Figure 21: Five (5) Bench Marks Established in June 2009

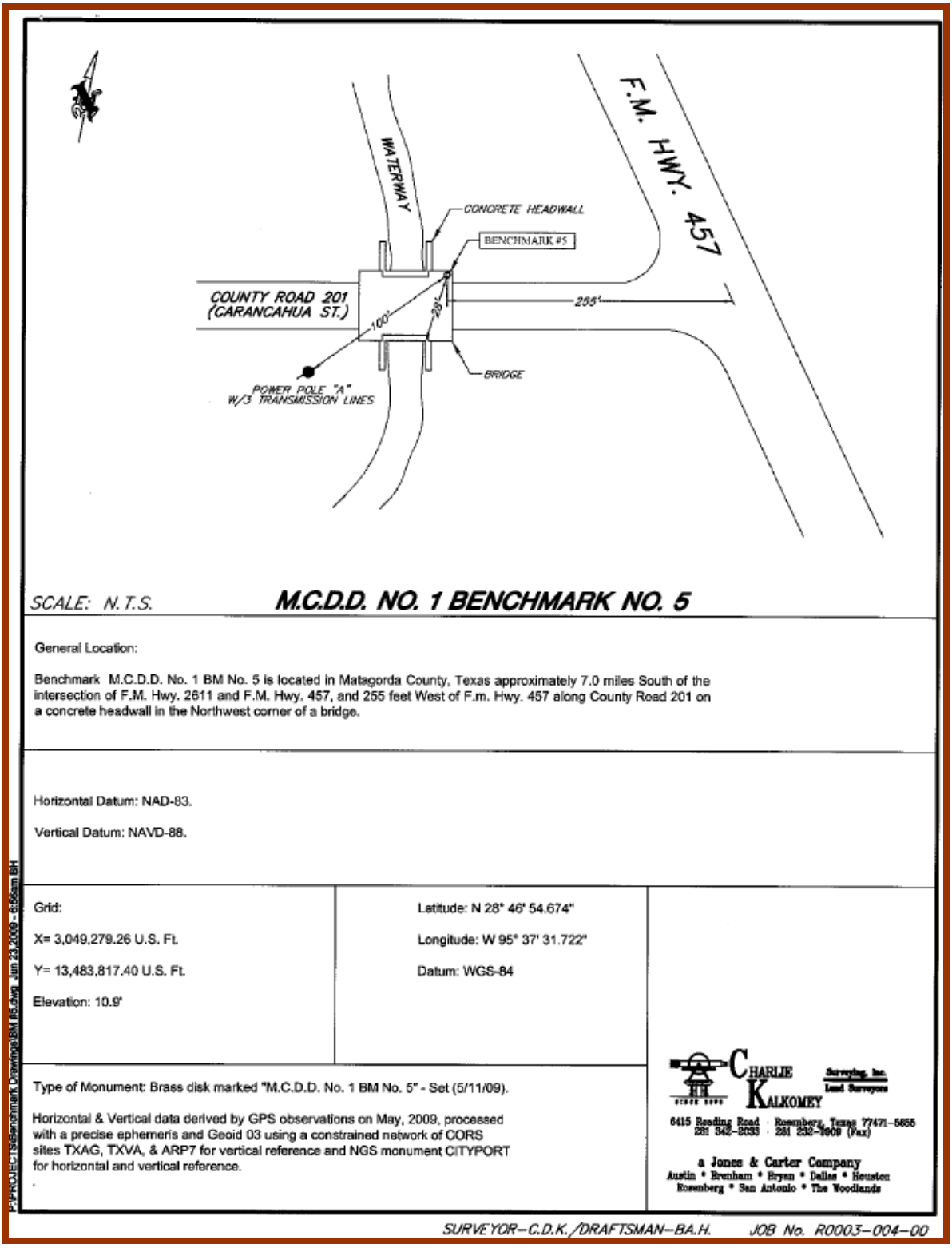


Figure 22: M.C.D.D. No. 1 Benchmark No. 5

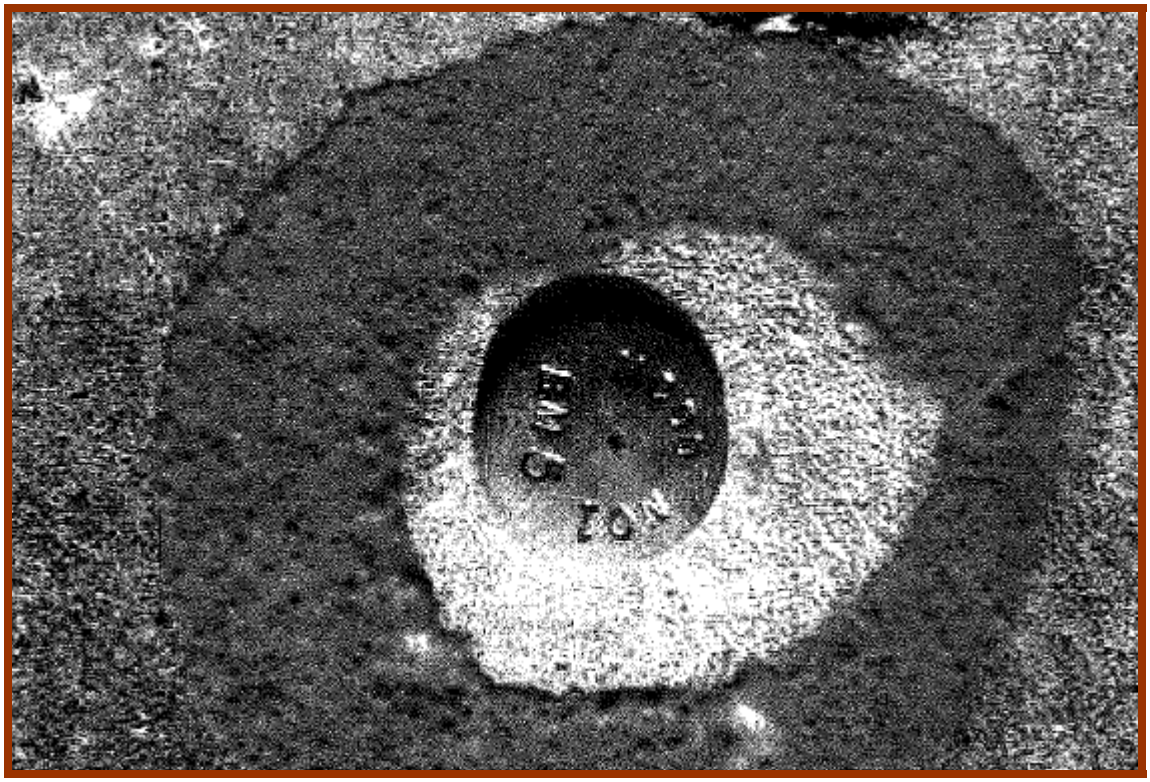


Figure 23: M.C.D.D. No. 1 Benchmark No. 5

3.0 ASSESS THE PROBLEM (CRS ACTIVITY 511.5)

Matagorda County and the cities of Bay City and Palacios are subject to flood losses during coastal storms and flood events. To address the problem, Matagorda County and the cities of Bay City and Palacios have enrolled in the NFIP and have adopted "higher standard" flood damage prevention ordinances.

Matagorda County enrolled in the NFIP Regular Program on June 19, 1970 based upon TWDB records. The initial FIS and FIRM for Matagorda County is dated May 1, 1971 establishing the Pre-FIRM date for structures within the unincorporated areas in Matagorda County. The Pre-FIRM date for the city of Bay City is April 23, 1971 and September 15, 1983 for the city of Palacios. The current FIRM for Matagorda County and the cities of Bay City and Palacios are accessible by the public via the Internet at www.fema.gov.

The FEMA has classified Matagorda County and the city of Bay City as Category "C" Repetitive Loss Communities, with each having more than 10 repetitive loss properties. Research of the NFIP Flood Insurance Paid Loss Database, provided by FEMA Region VI, lists 155 repetitive loss properties in Matagorda County (unincorporated areas), 41 repetitive loss properties in the City of Bay City and 4 repetitive loss properties in the City of Palacios that have received two or more paid flood insurance claims. Therefore as a condition of participation in the CRS Program, FEMA requires a Category "C" community, having more than 10 repetitive loss properties, to adopt a floodplain management plan that addresses all hazards within the community and not limited to only repetitive loss areas. The Matagorda County Flood Mitigation Plan was prepared

following FEMA's CRS Program planning criteria and qualifies as a floodplain management plan for participation in the CRS Program. Should Matagorda County and/or the cities of Bay City and Palacios choose to enroll in FEMA's CRS Program, flood insurance policies for all properties located within the CRS Community would receive an initial 5% reduction (CRS Class 9) for annual flood insurance premiums and policies. Additional flood insurance policy premium reductions will be granted when the CRS Community improves its CRS rating.

3.1 DISCUSSION OF THE NUMBER AND TYPE OF BUILDING SUBJECT TO THE HAZARDS.

Based on FEMA Multi-Year Flood Hazard Identification Plan (MHIP) Version 2.0, September 2006, Matagorda County has 18,611 housing units and a population of 37,957 (2000 Census). Table 4: NFIP Policies and Claims Information for Matagorda County, summarizes policies and claims from 1978 to August 2008. MHIP Version 2.0 identified 11 declared flood disasters in Matagorda County. FEMA's website, www.fema.gov, lists NFIP policy and claims data for Matagorda County and the cities of Bay City and Palacios with a summary of 3,884 flood insurance policies in force with coverage totaling $717M. Based upon FEMA Community Information System (CIS) records, since 1978 a total of 1,391 flood claims have been paid for losses totaling $14.0 M. Based on an average flood damage claim of $ 10,096, there is strong justification to purchase flood insurance for flood-prone properties located throughout Matagorda County.

Table 4: NFIP Policies and Claims Information for Matagorda County

Annual Premiums	Community	Policies (#)	Coverage ($)	Claims (#)	Claims ($)	Repetitive Loss
$1,903,605	Matagorda County (Unincorporated)	2,198	$390,952,200	937	$11,307,209	96
$523,523	City of Bay City	1,191	$226,860,400	386	$2,408,858	40
$263,193	City of Palacios	495	$99,632,900	68	$327,866	4
$2,690,321	Matagorda County Total	3,884	$717,445,500	1,391	$14,043,933	140

NFIP Data as of February 28, 2009

The National Flood Insurance Program - Texas Repetitive Loss List shows Matagorda County and City of Bay City as Category "C" Repetitive Loss Communities having 10 or more repetitive loss properties. Repetitive Loss Properties are properties that have received two or more paid flood insurance claims that exceed $1000.00 per claim. The NFIP classifies Repetitive Loss Communities based upon the total number of repetitive loss properties within the community:

Class "A" no repetitive loss properties within the community
Class "B" more that one but less than 10 repetitive loss properties within the community
Class "C" 10 or more repetitive loss properties within the community

The Repetitive Loss Properties and categories for Matagorda County are as follows:

Community	Total Category	Total Properties	Losses	Payments
Matagorda County (unincorporated)	"C"	96	218	$2.42M
City of Bay City	"C"	40	116	$1.26M
City of Palacios	"B"	4	7	$37,980
Total		**140**	**341**	**$3.72M**
Average Losses Per Property and Average Loss		2.43		$10,903

Notes:

- Category is the NFIP Repetitive Loss Community Category
- Total Properties is the total number of repetitive loss properties within the community
- Losses is the total number of paid flood insurance policy claims paid for repetitive loss properties
- Payments is the total paid flood insurance policy claims paid for repetitive loss properties
- Average is the average number of claims per property and average claim payment
- Note that there is a discrepancy in the number of Repetitive Loss Properties, varying from 140 to 155) in the various FEMA and NFIP databases due primarily to properties that have been mitigated but still included in the database and properties with incorrect or incomplete addresses that are not able to be located and verified by TWDB, Matagorda County, Bay City and Palacios.

The (2008-2009) annual flood insurance premium for the 3,884 policies in force in Matagorda County and the cities of Bay City and Palacios is $2,690,321. Communities that adopt sound floodplain management programs, as demonstrated by the recent efforts by Matagorda County and the cities of Bay City and Palacios, are eligible to enroll in FEMA's CRS Program. A CRS Rating of 9 for Matagorda County and all participating cities would result in a 5% annual flood insurance premium reduction for all NFIP policies and the annual flood insurance premium savings would be approximately $134,500. If all 3,884 policies were for properties located in the designated SFHA the annual premium savings would be $ 269,000 for CRS Class 8 and $403,500 for CRS Class 7. The Goals of the Matagorda County Flood Mitigation Plan is for one or more of the participating communities to enroll in CRS with a goal to obtain a CRS Class 7 classification. A CRS 7 classification would result is a maximum of 15% annual premium savings for properties located in the SFHA and could be as much as $1.8M over the 5-year CRS rating period. This assumes that the flood insurance policy base remains at current levels and premium rates do not increase. Both assumptions are unlikely because historically the NFIP policy base increases as the public become more aware of flood hazards and unlikely due to the major flood losses that have occurred in recent years will most likely result in NFIP policy premium increases.

3.2 STRUCTURES THAT HAVE RECEIVED FLOOD INSURANCE CLAIMS.

Matagorda County has experienced numerous flooding events with many occurring prior to the creation of the NFIP and not reported in FEMA's NFIP Flood Loss Records. Properties that

flood repeated times have become a National concern and prompted Federal and State legislative actions such as the National Flood Insurance Program Reform Act, Texas Senate Bill 936 granting legal authority for Texas counties to adopt higher floodplain management standards and Senate Bill 1436, transferring the State NFIP Coordinator role to the TWDB and funding floodplain management programs in Texas. FEMA classifies a Repetitive Loss Property as a property (or structure) that has received two or more paid NFIP flood insurance claims that exceed $1,000.00 each. The TWDB prepared Appendix A of the State Hazard Mitigation Plan titled "Repetitive Flood Loss Mitigation Strategy" dated January 2008, listing Matagorda County and the cities of Bay City and Palacios with a total of 144 Repetitive Loss Properties that have suffered 404 flood losses totaling $6,165,539 with an average loss payment of $15,261. The Matagorda County Flood Mitigation Planning Committee expressed concern that the number of Repetitive Loss Properties will increase with the next flood event based on the large number (1,391) of flood insurance claims that have been paid in Matagorda County and the small percentage of properties (3,884 of 18,611 housing units = 20%) have individual flood insurance policies in force.

The Flood Insurance Reform Act (FIRA) of 2004 was signed into law June 30, 2004. The FIRA initiates a five-year pilot program to assist local communities with mitigating damage and loss to "severe repetitive loss properties". Residential, one to four unit, severe repetitive loss properties are defined as: 1) have been the subject to four of more separate claims valued at more than $5,000 each and collectively valued at more than $20,000; or 2) properties with two or more claims the total value of which exceeds the value of the property. Multifamily properties with five or more units also are covered by the mitigation program and will be designated according to a definition of "severe repetitive loss" for multifamily property established by FEMA through regulations. The 2008 Repetitive Flood Loss Mitigation Strategy prepared by the TWDB identifies five (5) Severe Repetitive Loss (SRL) properties located in Matagorda County.

The SRL pilot program will provide funding to state and local governments to fund mitigation activities. The mitigation activities may include elevation, relocation, demolition, rebuilding, flood-proofing and purchasing property. The FIRA establishes a formula for distribution of federal mitigation funds to state and local governments, provided the state or local governments match 25% of the federal funding granted. The state and local government matching funds requirement can be reduced to 10% at the discretion of FEMA if the state has an approved mitigation plan and the Director of FEMA determines that the state has taken action to reduce the number of severe repetitive loss properties. The TDEM prepared and submitted the Texas Mitigation Plan to FEMA to comply with the Disaster mitigation Act of 2000 requirements. The Texas Mitigation Plan was prepared as an "enhanced" plan and addresses specific issues such as severe repetitive loss properties. If the Texas Mitigation Plan prepared by TDEM is approved by FEMA it should reduce the local governments match to 10% for mitigation of severe repetitive loss properties. State Hazard Mitigation Plan Appendix A, Repetitive Flood Loss Mitigation Strategy, was prepared by TWDB in 2008 to address the federal requirements necessary for the State of Texas to receive an increased federal cost share of up to 90 percent for mitigation grants funded under FEMA's Severe Repetitive Loss Program.

As a proposed mitigation action of the Matagorda County Flood Mitigation Plan, a Repetitive Loss Plan must be developed by communities that may elect to enroll in FEMA's CRS Program.

The Repetitive Loss Plan must be reviewed and updated annually by each community that elects to enroll in the CRS Program. It is important to note that flooding damaged properties are located throughout the County but exact records (numbers and damages) are not known because many of the properties and losses were not covered by NFIP flood insurance. Neither FEMA nor the TDEM maintain records that indicate all flooded properties and damages within Matagorda County and participating communities.

3.3 MATAGORDA COUNTY FLOODPRONE AND REPETITIVE LOSS AREAS

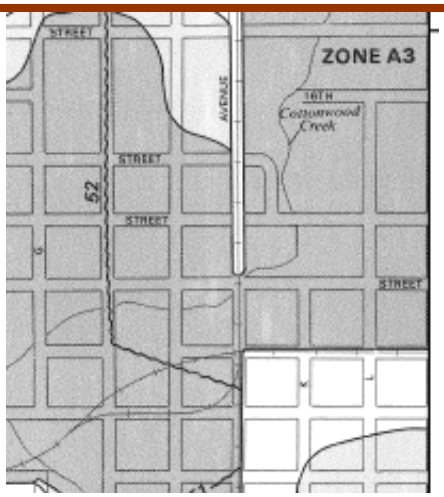
The Matagorda County Flood Mitigation Planning Committee identified flood risk areas where properties have been damaged multiple times by flood water and storm surge. The Planning Committee discussed the possibility that the Joint COE/ FEMA Gulf Coast Hurricane Surge Study will identify higher Base Flood Elevations (BFEs) and wider Zone VEs in coastal areas in Matagorda County. Higher BFEs and wider Zone VEs will place 100's of properties in the Special Flood Hazard Area in Palacios, Sargent Beach and coastal areas along Matagorda Bay and the Gulf of Mexico. The following figures were compiled from the Matagorda County FIRM and contain approximately 1,600 floodprone properties of which 140 are classified as repetitive loss properties:

City of Bay City and Floodprone and Repetitive Loss Properties Located Along Cottonwood Creek:

Bay City - Avenues G, H and L (approximately 800 floodprone properties including 40 designated repetitive loss properties are located in Zone A3 on FIRM Panel 485455 0005C, June 5, 1985) – FEMA Firmette of this area is included in Attachment D

Cottonwood Creek Drainage Improvements – Utilizing funding from the TWDB, the City of Bay city prepared the cottonwood Creek Flood Protection Plan in 1990 and constructed the Cottonwood Creek Diversion in the early 1990's. The project was designed and constructed to lower base flood elevations and remove 620 properties from the 1% (100-year) floodplain. A Letter of Map Revision (LOMR) was not submitted to FEMA; however, there have been no reported flood damages along Cottonwood Creek since the project was completed.

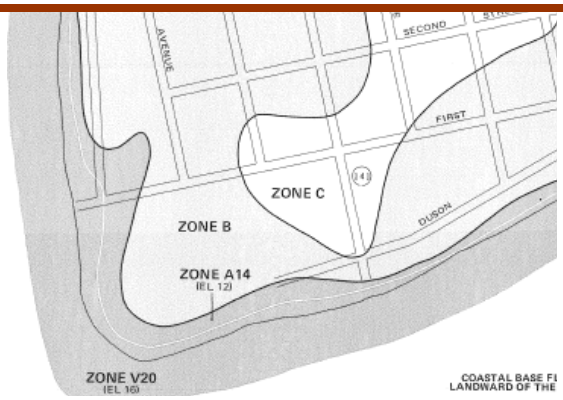
Bay City - 3rd , 6th, 7th and 12th Streets (approximately 500 floodprone properties are located in Zone A3 on FIRM Panel 485455 0005C, June 5, 1985) - FEMA Firmette of this area is included in Attachment D



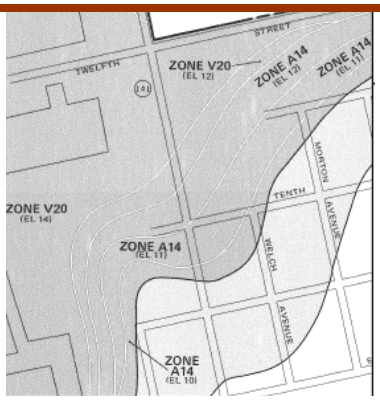
Cottonwood Creek Area 1 shown on City of Bay City FIRM Panel 485455 0005C, June 5, 1985

Cottonwood Creek Area 2 shown on City of Bay City FIRM Panel 485455 0005C, June 5, 1985

City of Palacios - Waterfront areas along Duson at Bay Blvd (80 floodprone properties, including 4 repetitive loss properties, located in Zones A14, B and C on FIRM Panel 485495 0002D, February 5, 1986) - FEMA Firmette of this area is included in Attachment D.



Waterfront areas along Duson at Bay Blvd shown on City of Palacios FIRM Panel 485495 0002D, February 5, 1986

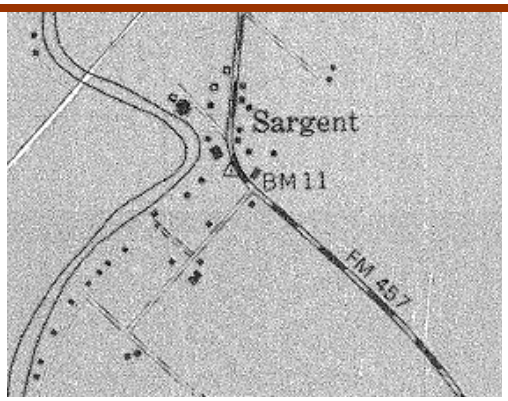


Marina areas shown on the City of Palacios FIRM Panel 485495 0002D, February 5, 1986

City of Palacios Waterfront Areas near the Marina (30 floodprone properties located in Zones V20 and A14 on FIRM 485495 0002D, February 5, 1986) - FEMA Firmette of this area is included in Attachment D

Town of Matagorda – (Population 710 with an estimated 250 structures located in Zone C protected by levees as shown on the Matagorda County FIRM Panels 485489 0555D and 485489 0565D dated May 4, 1992. The area behind the levee may be remapped by FEMA as Zone AE if the levees are not certified as providing flood protection placing most structures in Zone AE) - FEMA Firmette of this area is included in Attachment D.

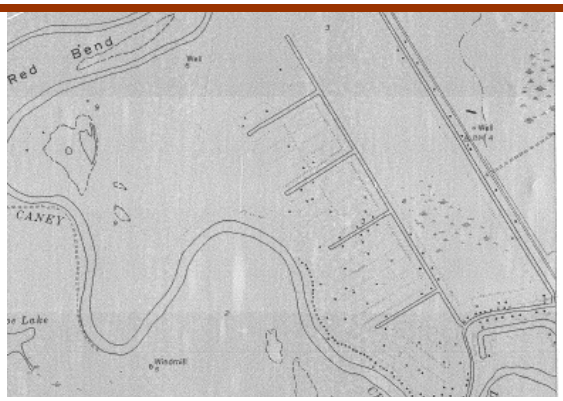
Town of Matagorda Levee area from the Matagorda County FIRM Panels 485489 0555D and 485489 0565D dated May 4, 1992



Sargent area along Caney Creek near FM 457 shown on Matagorda County FIRM Panel 485489 0450D dated May 4, 1992

Sargent Retirement Community in Zone A – (Population of 900 with approximately 200 flood prone properties located in Zone A subject to flooding from Caney Creek as shown on Matagorda County FIRM Panel 485489 0450D dated May 4, 1992) - FEMA Firmette of this area is included in Attachment D.

Sargent - Caney Creek Area in Zone V13 and A12 – (300 flood prone properties located in Zone V13 and Zone A12 subject to coastal surge flooding and flooding from Caney Creek shown on Matagorda County FIRM Panel 485489 0450D, May 4, 1992) - FEMA Firmette of this area is included in Attachment D.



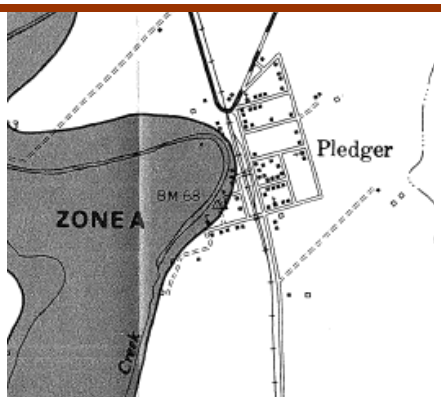
Sargent coastal area shown on Matagorda County FIRM Panel 485489 0450D, May 4, 1992

The community of Blessing shown on Matagorda County FIRM Panel 485489 0350C, March 18, 1985

Blessing (Population of 853 with approximately 300 properties located in Zone C but subject to flooding from Caney Creek and heavy rainfall. Reference Matagorda County FIRM Panel 485489 0350C, March 18, 1985) - FEMA Firmette of this area is included in Attachment D.

Tres Palacios River Area 1 – low lying area with 40 properties subject to overflow flooding from the Tres Palacios River and tributaries shown on Matagorda County FIRM Panel 485489 0350C, March 18, 1985) - FEMA Firmette of this area is included in Attachment D

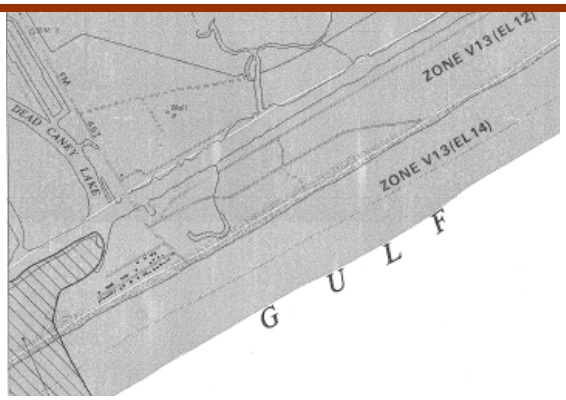
Tres Palacios River Area 1
shown on Matagorda County
FIRM Panel 485489 0350C, March 18, 1985



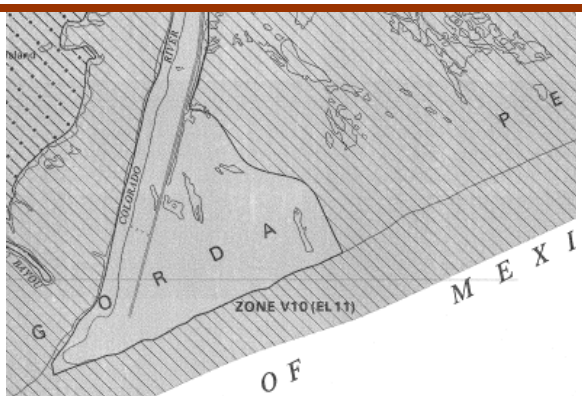
The Community of Pledger area
Caney Creek shown on Matagorda County
FIRM Panel 485489 0025C, March 18, 1985

Pledger – (Low lying areas with 50 properties in Zones A and C subject to overflow flooding from Caney Creek shown on Matagorda County FIRM Panel 485489 0025C, March 18, 1985) - FEMA Firmette of this area is included in Attachment D.

Sargent Beach (50 waterfront properties in Zones V 13 subject to coastal surge flooding shown on Matagorda County FIRM Panel 485489 475D, May 4, 1992) - FEMA Firmette of this area is included in Attachment D



Sargent Beach waterfront area shown
on Matagorda County
FIRM Panel 485489 475D, May 4, 1992



Matagorda Peninsula area shown
on Matagorda County
FIRM Panel 485489 0725D, May 4, 1992

Matagorda Peninsula – Approximately 150 waterfront properties, fronting on the Colorado River and the Gulf of Mexico, located along Beach Front Road, Beach Road and Dunes Road and shown in Zone V10 and Coastal Barrier Resource Act (CBRA) areas on Matagorda County

FIRM Panel 485489 0725D dated May 4, 1992 - FEMA Firmette of this area is included in Attachment D

The Mitigation Planning Committee recommends that these areas be targeted for future mitigation projects including: elevation; acquisition and relocation; demo-rebuild; and flood protection.

Matagorda County Repetitive Loss Plan

The Texas Water Development board provided repetitive loss data for Matagorda County and the cities of Bay City and Palacios to review and incorporate into the flood mitigation planning process. A stand alone Repetitive Loss Plan was prepared by the Matagorda county Flood Mitigation Planning Committee. The Repetitive Loss Plan includes FEMA's Repetitive Loss database containing flood loss data that includes owners name, property address, dates of flood insurance claims, and flood insurance claim amounts paid for both structure and contents. The Repetitive Loss Database was reviewed by the Mitigation Planning Committee and additional entries were made to the database including:

- Identification of duplicate claims
- Mitigation Actions
- Address corrections

The Repetitive Loss database includes privacy information therefore the following notice has been added to the Database:

"This information is covered under the Privacy Act of 1974 (5 U.S.C. § 552a) and must not be publicly disclosed. The records relating to individuals and individual properties are being made available through the FEMA routine use policy for the specific purposes of mitigation planning, research analysis, and feasibility studies consistent with the National Flood Insurance Program and for uses that further the floodplain management and hazard mitigation goals of the State and FEMA."

The Mitigation Planning Committee grouped the 140 Matagorda County repetitive loss properties into the twelve (12) floodprone area maps included in this section of the plan.

A recommended Mitigation Action is for Matagorda County and the cities of Bay City and Palacios to update the Repetitive Loss Database annually, prepare and submit AW501 forms to FEMA identifying incorrect addresses and mitigated properties that are no longer subject to flood risks. The Repetitive Loss Plan identifies properties that may be eligible for funding such as Hazard Mitigation Grant Program (HMGP), FMA, Texas Department of Rural Affairs (TDRA), USACE, Natural Resources Conservation Services (NRCS) and other Federal, State or non profit program funding for:

- Acquisition and relocation
- Elevation
- Mitigation by construction of flood protection systems
- Demolition and rebuild

3.4 PLAN AND PROCEDURES FOR WARNING AND EVACUATION

Websites provide valuable information related to warning and evacuation such as the NWS, the TDEM, the LCRA and others:

National Weather Service (NWS)	www.srh.noaa.gov/hgx
NWS "Turn Around Don't Drown"	www.srh.weather.gov
NWS Precipitation Analysis:	http://www.srh.noaa.gov/rfcshare/precip_analysis_new.php
USGS Real Time Flow	http://waterdata.usgs.gov/tx/nwis/current/?type=flow
Texas Division of Emergency Management (TDEM)	www.txdps.state.tx.us
Lower Colorado River Authority	www.lcra.org
Texas A&M Hazard Reduction and Recovery Center (HRRC)	http://hrrc.tamu.edu

The Emergency Management Plans for the cities of Bay City and Palacios and Matagorda County outline the plans and procedures for warning and evacuation during incidents, emergencies and disasters. As outlined in the emergency management plan, detailed information is described below.

Warning

The primary objective of a warning system is to notify key officials of emergency situations and disseminate timely and accurate warnings to the population at risk. Matagorda County acknowledges that the need to warn the public of impending danger may arise at any time. In order to reduce loss of life and property, adequate and timely warning must be provided. Appropriate action-oriented information must be supplied to citizens.

A warning period will be available for most emergency situations. However, the amount of lead-time will vary from hazard to hazard. Proper use of a warning period will save lives, reduce injuries and protect property. The most common warnings issued are those for severe weather. Other local hazards that may call for warnings are hazardous materials incidents from fixed facilities and/or transportation sources as well as radiological incidents and urban fires. Warnings will be issued when an event might endanger life or property.

The primary warning point for most warnings is the Texas Department of Public Safety Area Warning Center located in Houston, Texas. Upon notification of an emergency situation, the Department of Public Safety Area Warning Center will inform local warning points (LWP). The LWP for Matagorda County is the Matagorda County Sheriff's Office; the City of Bay City is the Bay City Police Department; and the City of Palacios is the Palacios Police Department. Each of these warning points are manned 24 hours per day. Upon receipt of the information, each LWP verifies warning information where necessary and disseminates pertinent information to specific local officials and departments. Once warnings are received and where necessary, verified, the LWP will disseminate appropriate information through available communication channels. Warnings will continue until such time they are no longer required.

The Matagorda County Sheriff has overall responsibility for warning however the Sheriff relies heavily on the Matagorda County Emergency Manager and each City Manager and Emergency Management Coordinator (cities of Bay City and Palacios) to carry out this function. The Sheriff assists each Emergency Management Coordinator by coordinating the warning system operations with other local agencies. Matagorda County and each community have adopted Emergency Response Plans that describe the procedures to disseminate emergency information to the news media for the general public. Local radio and television stations broadcast Emergency Alert System (EAS) messages when requested by local government officials. To effectively utilize the EAS, local governments and broadcasters coordinate the procedures used to transmit warning messages and instructions from the government to the broadcasters. Additionally, the NOAA Weather Radio station will broadcast weather watches and warnings issues by the NWS. Weather radios are activated when such messages are broadcast. LCRA has installed NOAA Radio Transmitters in the City of Bay City. NOAA weather radios have been installed in critical facilities in Matagorda County.

Receipt of Warning

The LWP Receives Warnings from the National Warning System (NAWAS), a 24-hour nationwide, dedicated, multiple line telephone warning system linking federal agencies and the states that is used to disseminate civil emergency warnings. The NAWAS is a voice communications system operated by FEMA. The warnings that are disseminated include attack warnings, fallout warnings, or natural/technological warnings.

The Texas Warning System (TAWAS) is a state level extension of NAWAS. It consists of a dedicated telephone warning system linking the state warning point (in Austin) with other regional warning centers throughout the state. Once a national warning is received at TAWAS, it is transmitted via teletype messages on the Texas Law Enforcement Telecommunications System (TLETS) to the LWP. TAWAS also disseminates warning messages from the Governor or other key state officials to appropriate regions within the state.

The NWS disseminates weather forecasts, watches, and warnings via the NOAA Weather Wire Service. The NOAA service is a satellite communications system that broadcasts to specialized receiver terminals. The following are among a few of the weather messages that are provided: flood and flash flood watches and warnings, severe weather watches and warnings, tornado watches and warnings, and tropical weather watches and warnings.

Finally, Matagorda County has developed a warning diagram for warning dissemination officials. Contained in Annex A of the Matagorda County Emergency Management Plan, the diagram outlines general warning dissemination procedures.

Dissemination of Warning

The LWP has a variety of means to broadcast warnings to the public. Matagorda County presently has no outdoor warning system and therefore must rely on the use of mobile sirens, public address systems, EAS and door-to-door notification. Within the limits of the authority

delegated, the LWP will determine if a warning needs to be issued and mechanism of dissemination.

All commercial radio and television stations and cable television companies must participate in the EAS as a condition of licensing. These organizations must broadcast presidential warnings and may broadcast state and local warnings as well. The stations are encouraged to broadcast all warning messages, however, ultimately the decision for broadcast lies with the broadcaster.

The public may be warned by route alerting using vehicles equipped with sirens and public address systems. The Emergency Management Plan has identified sheriff, police and fire vehicles to be used for this purpose. Response personnel going door-to-door may also deliver warnings. While each of the methods is effective in warning delivery, the methods are labor-intensive, time-consuming activities. These methods may be considered ineffective for warning large areas.

The NWS, USACE and the LCRA have established a network of rain and flood detection devices for the purposes of early warning within the Lower Colorado River Watershed. In the event of excessive rain, the NWS in conjunction with the LCRA will issue warnings where necessary.

Evacuation

A wide variety of emergency situations might require an evacuation of portions of the local area. Limited evacuations of a specific geographic area might be needed as a result of a hazardous materials transportation accident, major fire, natural gas leak, or localized flash flooding. Large-scale evacuation could be required in the event of a major hazardous materials spill, terrorist attack, extensive flooding, or hurricane.

Governor Rick Perry signed HB 1831, effective September 1, 2009, regarding disaster preparedness and emergency management. This Bill authorizes Texas counties and municipalities to order mandatory evacuation and impose fines for non compliance to mandatory evacuation orders. This law authorizes the Matagorda County Judge and the various City Managers and Emergency Management Coordinators to issue mandatory evacuation orders during disaster events. Once a disaster declaration has been issued and areas evacuated, actions may be taken to control re-entry into a stricken area. Additionally, the movement of people and occupancy of buildings within the disaster area may also be controlled.

Evacuation is one means of protecting the public from the effects of a hazard. In this instance, protection is achieved when persons are physically moved away from the hazard. Matagorda County recognizes the benefits of evacuation and has therefore developed evacuation procedures for the entire County.

The decision to evacuate is determined by each community Emergency Management Coordinator and elected officials. The Emergency Management Coordinator will evaluate the need for evacuation, plan for evacuation, and coordinate support for the evacuation effort.

During times that evacuations must be conducted because of incidents that occur without warning, evacuations may have to be planned quickly and carried out with available resources.

The County Judge and/or the various Mayors, City Managers or Emergency Management Coordinators will normally advise the public to evacuate a hazard area. In situations where rapid evacuation is critical to the continued health and safety of the population, the on-scene senior official may advise the public in the immediate vicinity to evacuate. In the case of hazardous materials spills or fire, the senior fire official will make the evacuation recommendation. During floods, the evacuation notice will generally be initiated after evaluation and recommendation of the Emergency Management Coordinator. For slowly developing emergency situations, advance warning should be given to affected residents as soon as it is clear evacuation may be required.

Persons to be evacuated should be given as much warning time as possible. For slow moving events, the evacuation notice should be given to affected residents if it appears that hazardous conditions may warrant such action. Citizens should be advised that the request to evacuate may occur with thirty minutes notice or less.

All warning modes will be utilized to direct the affected population to evacuate. Wherever possible, the warning will be given on a direct basis as well as through the media. The use of law enforcement and fire emergency vehicles moving through the affected area with sirens and public address systems is usually effective. However, if used, this procedure should be communicated to the public in advance to reduce confusion concerning vehicle usage. In addition, there should be door-to-door notifications.

Law enforcement personnel will sweep the evacuated area to ensure all persons have been advised of the evacuation and have responded accordingly. Persons who refuse to follow evacuation instructions will be left alone until all who are willing to leave have been provided for. If time permits, further efforts will be made to persuade those remaining to evacuate.

The public information officer will ensure that evacuation information is disseminated to the media on a timely basis. Instructions to the public identifying traffic routes to be followed, location of temporary reception centers as well as situation updates will be issued as information becomes available. When the incident that generated the need for evacuation is resolved, evacuees must be advised when it is safe to return to the area.

Matagorda County and the many Texas counties and communities located along the Texas Gulf Coast take hurricane evacuation seriously. The TDEM in partnership with the Texas A&M Hazard Reduction and Recovery Center has prepared Storm Evacuation Maps for each segment along the Gulf of Mexico including inlets, bays and affected areas. The hurricane evacuation information is accessible by the public on the web at: www.hurricanes.tamu.edu.

The Texas Department of Public Safety published the Disaster Sub-District 2C-Pierce Emergency Evacuation Traffic Management Plans and Contra-Flow Traffic Plans dated March 31, 2006 for Austin, Colorado, Fayette, Fort Bend, Matagorda, Washington, and Wharton Counties.

The TDEM Evacuation Maps for the Texas Gulf Coast Area include Matagorda County and are shown as Figure 24 Matagorda County Evacuation Routes, Figure 25 Matagorda Study Area – Evacuation and Figure 26 Inland Evacuation Map – Matagorda Study Area. The Evacuation Maps are also routinely published and distributed by public-private partnerships. The maps are made available to the public by businesses such as Radio and TV Stations, food stores, pharmacies, and other local businesses located throughout the community. The figures below are from TDEM's website ftp://ftp.txdps.state.tx.us/dem/plans_hurr_maps/hurr_map_msa.doc.

Hurricane Category	Wind Speed (MPH)	Risk Area Threatened	Matagorda Co. Area
1	74-95	Area 1	M1
2	96-110	Area 2	M2
3	111-130	Area 3	M3
4	131-155	Area 4	M4
5	<155	Area 5	M5

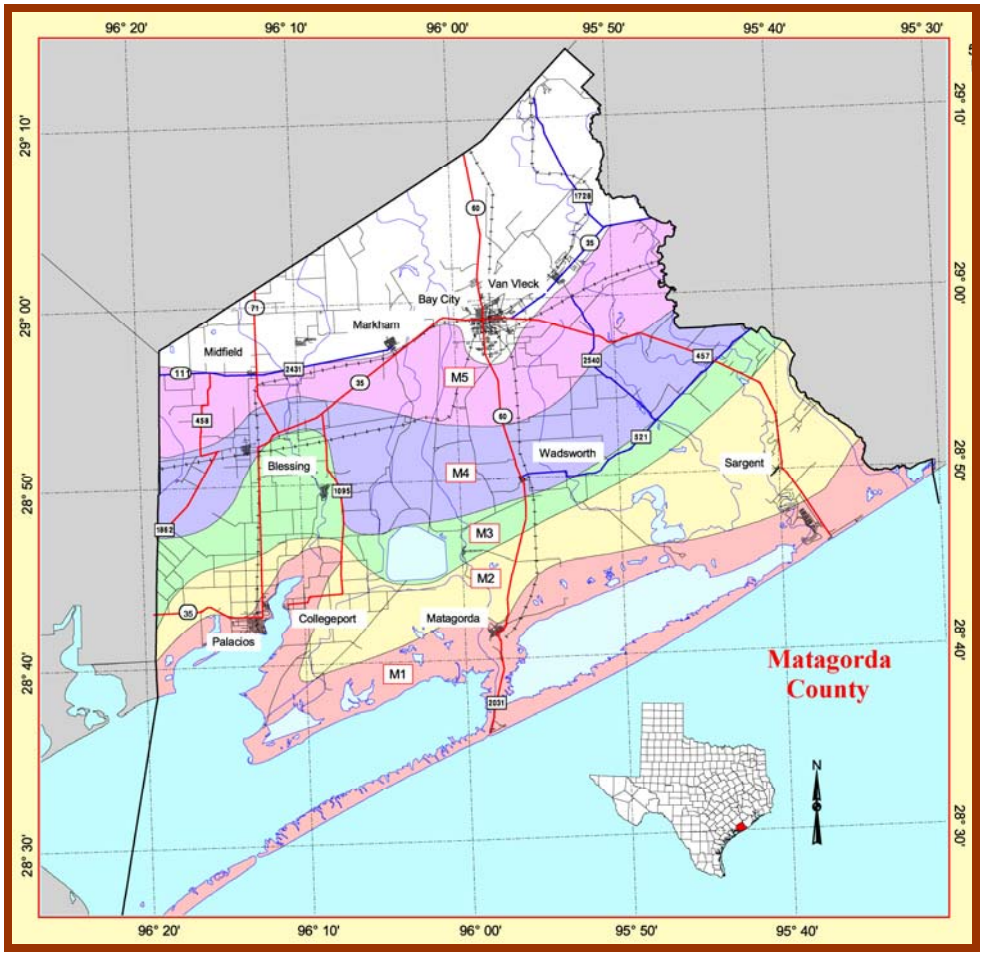


Figure 24: Matagorda County Evacuation Routes

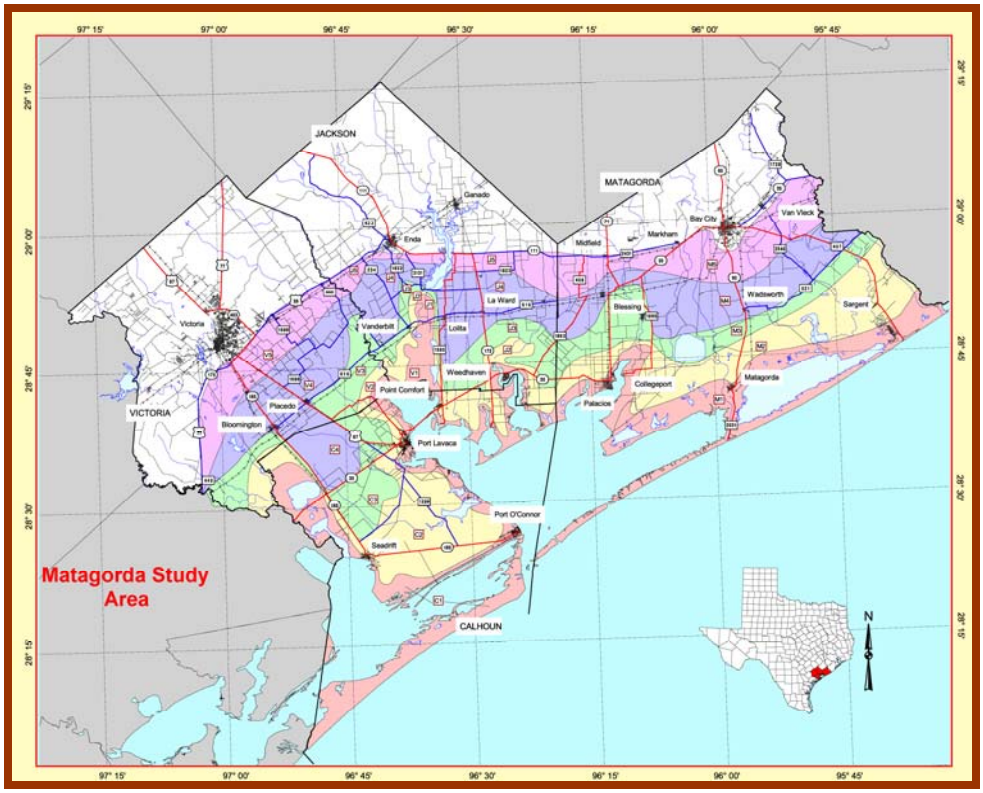


Figure 25: Matagorda County Study Area – Evacuation

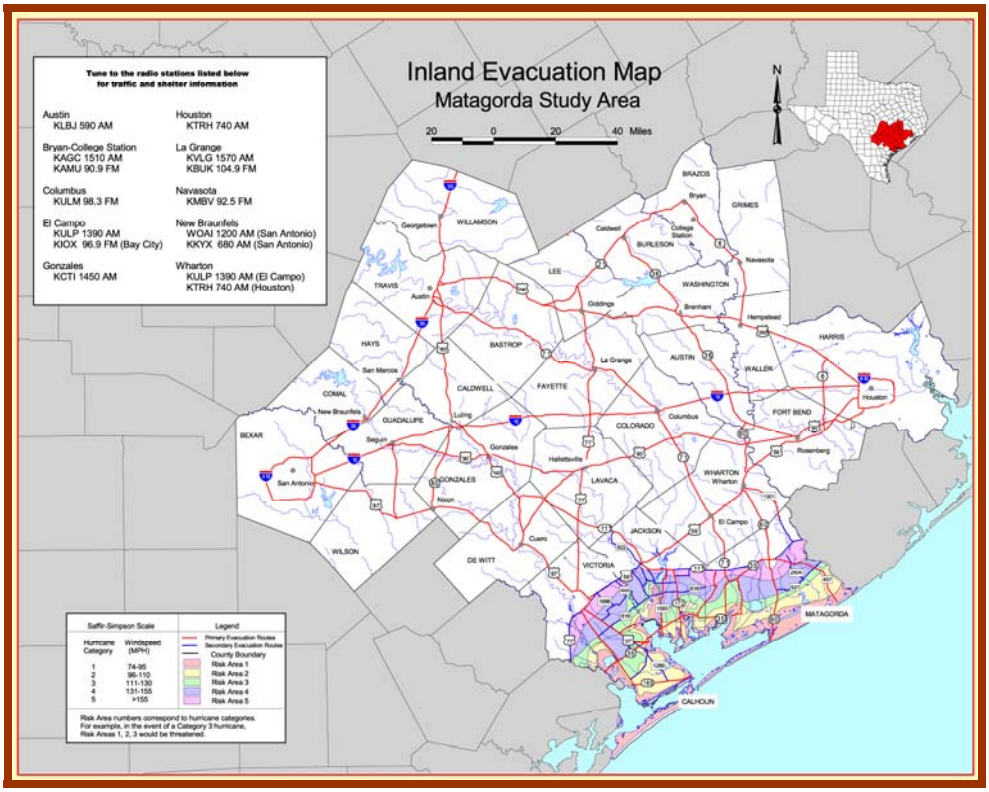


Figure 26: Matagorda County Study Area - Inland Evacuation Map

The Texas Division of Emergency Management's (TDEM) website contains the Report, *Hurricane Evacuation Time Estimates for the Texas Gulf Coast*, Hazard Reduction & Recovery Center, Texas A & M University, March 2002. This report, compatible with the evacuation maps above, describe an improved method for developing hurricane evacuation time estimates based on Empirically Based Large-Scale Evacuation Time Estimate Method (EMBLEM) that estimates estimated time enroute (ETE), evacuation route systems (ERS) for each study area along the Texas Gulf Coast, and trip generation time (TGT) required for households to begin evacuating. The following tables and Appendix C: Matagorda Study Area, are from the Texas A & M Report.

Table 5: Comparison of ETEs - Evacuation
(Calculated Using the Safwat and Youssef Model with Those Computed Using EMBLEM)

MATAGORDA STUDY AREA

	CAT1	CAT2	CAT3	CAT4	CAT5
MSA1: Calhoun/Victoria	5/8	7/8	10/9	10/10	11/10
MSA2: Calhoun/Jackson	5/7	5/8	5/8	5/8	5/8
MSA3: Matagorda West	6/7	6/8	7/8	8/9	8/9
MSA4: Matagorda East	5/7	5/8	5/8	6/8	6/8
MSA5: Victoria	--	5/7	5/7	5/7	5/7

APPENDIX C: MATAGORDA STUDY AREA

ETEs were modeled using the Evacuation Route System described by Safwat and Youssef (1997), with some exceptions noted below. Highway capacities were taken from Safwat and Youssef, but road status updates for 2002 were obtained from Regional Liaison Officers. Data from Lindell, et al. (2001) indicate that 20% of the study area population expect to travel on undesignated evacuation routes. Thus, there is some degree of conservatism in the ETEs from this source.

MSA3: Matagorda West ERS
This county has a coastal risk area with a relatively small population, so clearance times can be expected to depend principally on TGTs (warning and preparation times). It is very unlikely that evacuation demand will challenge ERS capacity and create evacuation traffic queues. For this reason, it is possible that actual evacuation times could be significantly lower than the ETEs.

MSA4: Matagorda East ERS
This county has a coastal risk area with a relatively small population, so clearance times can be expected to depend principally on TGTs (warning and preparation times). It is very unlikely that evacuation demand will challenge ERS capacity and create evacuation traffic queues. For this reason, it is possible that actual evacuation times could be significantly lower than the ETEs.

Evacuation Route System MSA3 (Matagorda West)

Evacuation Route Used	*Evacuation Route Capacity*
SH 35 / SH 71 / FM 1090	500
FM 1095 / SH 35	500
FM 458	100
Total Capacity of MSA3	1100 vehicles/hour

Risk Areas Served: Matagorda M1a, M2a, M3a, M4a, M5a

Table MSA3: Number of Evacuating Vehicles and Evacuation Time Estimates

	Storm Category				
Risk Area	Category One	Category Two	Category Three	Category Four	Category Five
M1a	1656	2298	3167	3542	3607
M2a	502	750	1087	1232	1277
M3a	335	526	786	898	932
M4a	425	693	1056	1213	1261
M5a	190	317	489	563	586
Total vehicles	3108	4584	6585	7448	7663
ETE (hrs)	7	8	8	9	9

Evacuation Route System MSA4 (Matagorda East)

Evacuation Route Used	*Evacuation Route Capacity*
FM 2031 / FM 521 / SH 60	500
FM 457	500
FM 521 / FM 2540	100
Total Capacity of MSA4	1100 vehicles/hour

Risk Areas Served: Matagorda M1b, M2b, M3b, M4b, M5b

Table MSA4: Number of Evacuating Vehicles and Evacuation Time Estimates

	Storm Category				
Risk Area	Category One	Category Two	Category Three	Category Four	Category Five
M1b	322	447	616	689	701
M2b	713	1066	1544	1750	1814
M3b	322	506	755	862	895
M4b	425	693	1056	1213	1261
M5b	190	317	489	563	586
Total vehicles	1972	3029	4460	5077	5257
ETE (hrs)	7	8	8	8	8

In 2002, the Texas Division of Emergency Management (TDEM) informed Texas communities that Evacuation Time Estimates (ETEs) for hurricane evacuations had been revised. For the Matagorda County area, evacuation estimates for a Category 5 storm vary from six (6) hours up to nine (9) hours. The revised times incorporate risk area population data from the 2000 Census and the results of a 2001 behavior study of the residents of the Texas coast. TDEM is confident that the new methodology for determining ETEs is a more accurate portrayal of what people will do an how long the evacuation process will take.

In the letter from TDEM the factors impacting evacuation times were identified as follows: increases in population, increases in the number of vehicles used for evacuation, evacuee preparation time, sympathetic evacuation, and traffic modeling. Most areas within the Coastal Corridor from Houston to Corpus Christi area have experienced increases in population as a result of the 2000 Census figures. The increase in population subsequently increases the time necessary for evacuation. With an increased population, the number of vehicles used for evacuation has also increased. In a behavioral study conducted in 2001, respondents indicated that they had more vehicles per capita than in previous surveys, of which they intend to take with them when they evacuate. When evaluating evacuation time, the behavioral study found that evacuation preparation time exceeds previous estimates. Most individuals were assumed to evacuate within three hours of an evacuation notice being delivered. Realistically, the behavioral study indicated evacuees would evacuate within four to six hours of receipt of the evacuation notice.

Evacuation traffic is a major concern for Matagorda County because the primary traffic route is east or west on US-59 (new IH-69). Travel to the east is immediately impacted by the Houston metroplex and travel to the west is parallel to the Gulf Coast and perhaps in harm's way. Travel to the north is limited to SH-60 and SH-71, which are considered to be secondary roadways. Northbound SH-60 and SH-71 evacuation is also limited by IH-10, which is only 37 miles NW of US-59.

During an evacuation event there is a major concern that portions of the Houston area (Sugarland, Missouri City, Richmond Rosenberg) may evacuate to the southeast along US-59. Heavy traffic from the Houston area would complicate options for evacuations from Matagorda County.

It is understandable that the latest evacuation time estimates for areas in Matagorda County are considerably longer due to population increases in the Texas Gulf Coast region.

In spite of a mandatory evacuation order issued by Galveston County prior to Hurricane Ike there was a large number of citizens that ignored the order and as a result an accurate death count from Hurricane Ike in Galveston County may never be known.

3.5 CRITICAL FACILITIES

The Matagorda County Flood Mitigation Planning Committee reviewed the Critical facilities List identified in Appendix A of the TCRFC all-hazards Mitigation Plan. The Planning Committee selected the following facilities as critical to the fulfillment of city and county services as well as facilities that are vulnerable to the impact of disaster. The following locations are listed as vulnerable facilities with their approximate flood zone identified:

Facility	Address	Flood Zone
City Hall – Bay City	1901 5th St, Bay City	B
City Hall – Palacios	205 Fourth St	
County Court House/Bay City	1700 Seventh St, Bay City	C
Matagorda Co. Annex	2200 Seventh St, Bay City	B
Bay City Police Department	2201 Ave H, Bay City	B
Sheriff's Office/Bay City	2308 Ave F, Bay City	C
Bay City VFD	1920 6th Street	B
Palacios Fire Department	201 4th Street	
Blessing VFD	88 Ave A North, Blessing	C
Tres Palacios Oaks VFD	5855 FM 2853, Blessing	C
Matagorda VFD	673 Market St., Matagorda	C
Markham Vol. Fire House #4	43 Ave F, Markham	C
Kendleton VFD	13698 Willie Melton Blvd	
Collegeport VFD	15308 FM 1095, Collegeport	
Midfield VFD	52 Rawls Ave, Midfield	
Danbury Fire Department	6100 5th Street, Danbury	
Francitas VFD	88 Ave A North, Blessing	C
Garwood VFD	Main Street, Garwood	
Matagorda Regional Medical Center, Bay City	104 7th Street, Bay City	C
Palacios Community Medical Center	311 Green Ave, Palacios	
Gulf Coast Medical Center, Wharton, Texas	10141 US-59, Wharton	Zone X Shaded
Matagorda County EMS	1300 7th, Bay City	C
Matagorda County Drainage District #1	3520 Nichols, Bay City	C
Matagorda County Navigation District #1	1602 Business SH-35/TX Spur 141, Palacios	
Sargent Waste Water Treatment Plant	Sargent	V13
Bay City Waste Water Treatment Plant	4311 Starling	A3; B and C
Palacios Waste Water Treatment Plant		

The Bay City Fire Department also provides Emergency Medical first responder services. Fire Department representatives respond to medical calls but do not provide patient transport. The Bay City EMS provides patient transport to the appropriate medical facility.

Schools

School facilities often provide emergency shelter when needed. Bay City, Palacios, Blessing, El Maton, Matagorda, Van Vleck and Markham each have school districts with the following twenty four (24) schools:

City	School	Address	Flood Zone
Bay City	Holy Cross School	2001 Katy	Zone C
Bay City	Cherry Elementary	2509 8th	Zone A3
Bay City	Tenie Homes Elementary	3200 5th	Zone C
Bay City	Pierce Elementary	Closed	
Bay City	Roberts Elementary	1212 Whitson	Zone C
Bay City	McAllister Middle School	Brandon Drive	Zone C
Bay City	Bay City Middle School	2417 16th	Zone A3
Bay City	Bay City Jr High	1507 Sycamore	Zone B
Bay City	Bay City High School	400 7th	Zone C
Bay City	Matagorda Co JJAEP	2006 Kilowatt Dr.	Zone C
Palacios	Central Elementary	1001 5th Street, Palacios	
Palacios	East Side Elementary	901 2nd Street, Palacios	
Palacios	Palacios Jr High	Stark Drive, Palacios	
Palacios	Palacios High School	Stark Drive, Palacios	
Palacios	Matagorda Co Alternate Education		
Matagorda	Matagorda Elementary	800 Wightman St, Matagorda	
Markham	Markham Elementary	200 6th St. West, Markham	
Blessing	Blessing Elementary	139 FM 616, Blessing	
El Maton	Tidewater Intermediate	2469 FM 459, El Maton	
El Maton	Tidewater High School	144 FM 1095, El Maton	
Van Vleck	Van Vleck Elementary	178 4th St. South, Van Vleck	
Van Vleck	O H Herman Middle	128 Ave H, Van Vleck	
Van Vleck	E Rudd Intermediate		
Van Vleck	Van Vleck High School	133 4th St. South, Van Vleck	

Business/Industry

The business opportunities within Matagorda County are enhanced by its location accessible by the Gulf Intracoastal Waterway, SH-35 and nearby US-59 soon to be designated IH-69 with connections from Mexico to Houston and then throughout the US.

Matagorda County is home to the South Texas Nuclear Power Plant, and numerous petrochemical and agribusiness.

Electrical Service and Power Transmission in Matagorda County

Jackson Electric COOP energizes 2,104 miles of electric transmission and distribution lines to serve 12,568 customers in Jackson, Matagorda, Brazoria and Calhoun counties.

American Electric Power (AEP) supplies power to 5 million customers located in Arkansas, Indiana, Kentucky, Louisiana, Michigan, Ohio, Oklahoma, Tennessee, Texas, Virginia, and West Virginia. AEP provides electric service to Matagorda County customers in Bay City and Sargent.

3.6 WETLANDS, RIPARIAN AREAS, AND SENSITIVE AREAS

Wetlands, a natural resource, are a key mitigation tool in the fight against rising floodwaters. Wetlands diminish wave action, therefore controlling erosion. They also allow sediment to settle out of storm water, therefore improving water quality. When wetlands are used for construction, the above-mentioned benefits are lost; water flow is restricted causing greater flooding; and valuable property is lost causing an increase in flood insurance rates.

The Colorado River Corridor, Matagorda Peninsula and areas fronting on Matagorda Bay are rich with wetlands and wildlife habitat areas. Matagorda County and the cities of Bay City and Palacios participate in the National Flood Insurance Program and have adopted flood damage prevention ordinances that require Section 404 (Clean water Act) Wetland Permits; enforcement of the Endangered Species Act (ESA); and require that State and Federal permits and approvals be obtained as part of the floodplain development process that impacts wetland an wildlife habitat areas.

Matagorda County, participating communities and the Lower Colorado River Authority have developed numerous parks, wildlife refuge areas, and outdoor recreational facilities. There are facilities consisting of walking trails, picnic tables, swimming pools, tennis courts, ball fields, boat ramps, and outdoor recreation areas. Both the city of Bay City and Palacios have invested extensively in local park system.

Wetland Loss in Matagorda County

The following information is from http://www.texasep.org/html/wql/wql_5cst_wtlnd.html, Texas Environmental Profiles, Wetlands.

Wetlands can be located either near the coast (coastal wetlands) or farther inland (interior wetlands). Though less than five percent of the state's total area is wetlands, and an even smaller percentage is coastal wetlands, Texas has been identified as one of 19 states with significant coastal wetlands and significant coastal wetland losses.

Wetlands are defined in state law as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. The major wetland ecosystems of Texas include coastal marches and estuaries, forested scrub/shrub, tidal flats, bottomland hardwoods and the playa lakes, concentrated in the Panhandle. Coastal wetlands include salt, intermediate, brackish, and fresh marshes, tidal inlands, and forested scrub.

Coastal wetlands act as a natural filter for various natural and human-made contaminants, protecting the overall estuarine system. Coastal wetlands also help control excessive runoff to the bays and erosion of lands, protecting people and property from storms, floods, and erosions by serving as a buffer between land and water. The wetlands also provide important nutrients for the bay ecosystem, as well as essential habitat for many species of waterfowl, reptiles, mammals, fish, and other wildlife.

In addition to these benefits in habitat, water quality, flood control, and erosion control, coastal wetlands provide direct benefits to the Texas economy through commercial and sport fishing, hunting, nature tourism, and bird-watching. Shrimp, oysters, blue crab, black drum, and southern flounder either depend directly on habitat provided by wetlands for spawning and nursery grounds or receive important nutrients and food from fish and wildlife that depend on these wetlands. Finally, property values of developments near open spaces such as wetlands increase, resulting in higher tax revenues for local governments and schools.

Amount of Coastal Wetlands and Wetlands Loss in Texas

Estimating the amount of coastal wetlands and wetlands loss is unfortunately difficult because of differing definitions and climactic changes, which impact their occurrence. Estimates of the amount of coastal wetlands loss in Texas vary by source. In 1965, the U.S. Fish and Wildlife Service estimated that Texas coastal marshes made up a total of 937,400 acres, while a 1991 NOAA Report -- using different definitions and methodologies -- estimated there were 6.4 million acres of inland wetlands -- mainly in riparian areas -- and 1.65 million acres of coastal wetlands, including 962,400 acres of coastal marshes, 410,000 acres of forested scrub and shrub and 275,000 acres of tidal flats. In a more recent 1997 study**,** scientists from the U.S. Fish and Wildlife Service—in cooperation with other federal and state agencies and again using different definitions—estimated that 4.1 million acres of coastal wetlands existed in the mid-1950s in a 20,000 square mile "coastal" area. By 1992, the study estimated that Texas had 3.9 million square acres of coastal wetlands, including 3.3 million acres of freshwater wetlands and 567,000 acres of saltwater wetlands.

The study did not define the quality of wetlands, but simply the number of acres they cover. Thus, while the total amount of coastal wetlands witnessed a relatively small decline in the past

forty years, the type and quality of wetlands has changed dramatically. For example, about 52 percent of the coastal freshwater wetlands were used for farmlands—mainly rice farming—in 1992, compared to 47 percent in 1955. Saltwater intrusion caused by canals, land subsidence (sinking), and drainage ditches has severely damaged some of the remaining wetlands.

Other recent studies have catalogued destruction of wetlands in individual areas. A 1993 study of the Galveston Bay system showed an estimated net loss of 33,400 acres -- about 19 percent of all wetlands -- between 1953 and 1989**.** Still another study published in 2002 examined the status and trends of wetlands on the Texas Barrier Islands, **Matagorda Bay** and San Antonio Bay within **Matagorda** and Calhoun Counties using color infrared photographs taken in 2001 and 1979 and black-and-white photographs taken in the 1950s. The regional study found over 45,000 acres of coastal wetlands, dominated by saltwater marshes and seagrass beds. The study actually found that the amount of saltwater marshes and seabed grasses actually increased over the time period -- albeit slightly -- but there was a major decline in the total area of tidal flats between the 1950s and 2001 -- declining from roughly 10,000 to 5650 acres over the period -- as well as major declines in freshwater marshes and Gulf beaches. **For example, on Matagorda Island, tidal flats declined from some 5,500 acres in the 1950s to some 2,250 acres by 2001, much of which can be explained by a rising sea level, a trend also reported on Mustang Island and San Jose Island.**

In the United States as a whole, an estimated 58,500 acres of wetlands—both coastal and interior—are lost each year. This includes both wetlands lost as a result of draining and filling projects requiring Army Corps of Engineers Section 404 permits and estimated loss from other sources not requiring such permits. In fact, about 80 percent of lost wetlands in the United States are not reported to the Corps of Engineers. And the amount of wetlands lost without any reporting to the U.S. Army Corps of Engineers is likely increasing, due to the January 2001 Supreme Court ruling which held that "isolated" wetlands not connected to streams, rivers and bays are not afforded protection under the Clean Water Act. The ruling has led to differing interpretations of what constitutes an "isolated" wetlands. In Texas, the Galveston District of the Army Corps of Engineers has been interpreting the ruling broadly, meaning that those wishing to fill and dredge wetlands along the coast which are only connected to waterways through flooding and overland flow during precipitation do not require a permit -- or mitigation -- to do so. The EPA and Army Corps of Engineers have proposed new rules on the Section 404 Permit process based upon the Supreme Court decision, although it may be several years until the rules are in place. In the meantime, filling or dredging many Texas coastal "isolated" marshes will in many cases not require a special permit.

Despite the continued loss of wetlands overall, net loss of wetlands in the United States has been reduced in recent years. The biggest reason for the decline is the reduction in the amount of wetlands utilized for agriculture. Areas such as the Northern and Southern Plains actually experienced a net gain of wetlands between 1982 and 1992, according to National Resources Inventory, a program under the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA). In addition, both volunteer mitigation programs run by the U.S. Fish and Wildlife Service, as well as mitigation requirements under the Army Corps of Engineers Section 404 program, have actually offset losses in some years. Both the 1985 Food

Security Act, and the 1996 and 2001 Farm Bills provided incentives to farmers to conserve and protect wetlands.

Several efforts are underway in the state to better map and protect coastal wetlands. In 1994, five Texas state agencies and four federal agencies began a web-based system to share information over the internet. Today, the Texas Wetland Information Network (WetNet) has begun to provide information about wetlands to internet users. In addition, the state has been digitizing the U.S. Fish and Wildlife's National Wetlands Inventory Program's maps and aerial photographs to better map and monitor changes in the state's wetlands. The TPWD plans to classify the entire Texas coastal zone and determine wetlands change in five-year periods.

ESTIMATED LOSS OF WETLANDS BY SOURCE IN GALVESTON BAY

CAUSE	TYPE OF WETLAND AFFECTED	NET LOSS, 1950–1990 (ACRES)
Subsidence and sea level rises (aquifer overpumping)	Estuarine bay marshes	24,600
Conversion to urban and agricultural use	Freshwater marshes	35,600
Dredge and fill activities	Estuarine bay marshes	7,070
Modifications of shoreline (flood control, salt water barriers, cooling ponds)	Estuarine bay marshes	6,300

Source: Galveston Bay National Estuary Program, Galveston Bay Environmental Characterization Report (Houston: Galveston Bay National Estuary Program, 1993), 218.

Figure 27: Estimated Loss of Wetlands by Source in Galveston Bay

Threats to Wetlands

Like estuaries, wetlands are subject to a variety of threats. Subsidence of land along the coast and the loss of coastline caused by soil erosion and a rising sea level have contributed to the loss of coastal wetlands. Each year, 225 acres of gulf shoreline wash into the sea. An estimated 21,000 acres of shoreline were lost between the mid-1800s and 1982. In some areas of Texas, overpumping of groundwater has led to subsidence of the land. This impact alone has led to the loss of an estimated 24,600 acres of marshes since the 1950s in the four-county Galveston Bay area. The U.S. Fish and Wildlife Service reports a loss of 20,000 acres of coastal marshes to open bays from land subsidence due to extraction of oil, gas, and water.

Another significant cause of coastal wetlands loss is conversion of wetlands for urban or agricultural development. Wetlands are sometimes drained and turned into rangeland or cropland or fitted for urban use, in part to keep up with population growth. They are sometimes impacted by dredging and filling operations, conducted mainly to widen canals such as the Gulf Intracoastal Waterway for navigation purposes, because dredged soil is often deposited in the

wetlands' open water sites. Construction of roads and levees can also alter the original tidal hydrological characteristics.

One dramatic example of wetlands destruction resulting from land-use changes has been the loss of shoal grass in the Lower Laguna Madre. Between 1965 and 1998, there was an estimated 60 percent reduction in shoal grass beds in this water body. Studies attribute the loss of sea grasses to suspension of fine-particle sediment caused by the dredging of the Gulf Intracoastal Waterway.

CAUSES OF COASTAL WETLAND LOSS

Direct Causes

- Drainage for crop production, timber production, and mosquito control.
- Dredging and stream channelization for navigation channels, flood protection, coastal housing development, and reservoir maintenance.
- Filling by dredged material and other solid waste disposal, roads and highways, and urban development.
- Construction of dikes, dams, levees, and seawalls for flood control, water supply, irrigation, and storm protection.
- Discharge of materials into waters and wetlands.
- Mining of wetlands soils for peat, coal, sand, gravel, phosphate, and other materials.

Indirect Causes

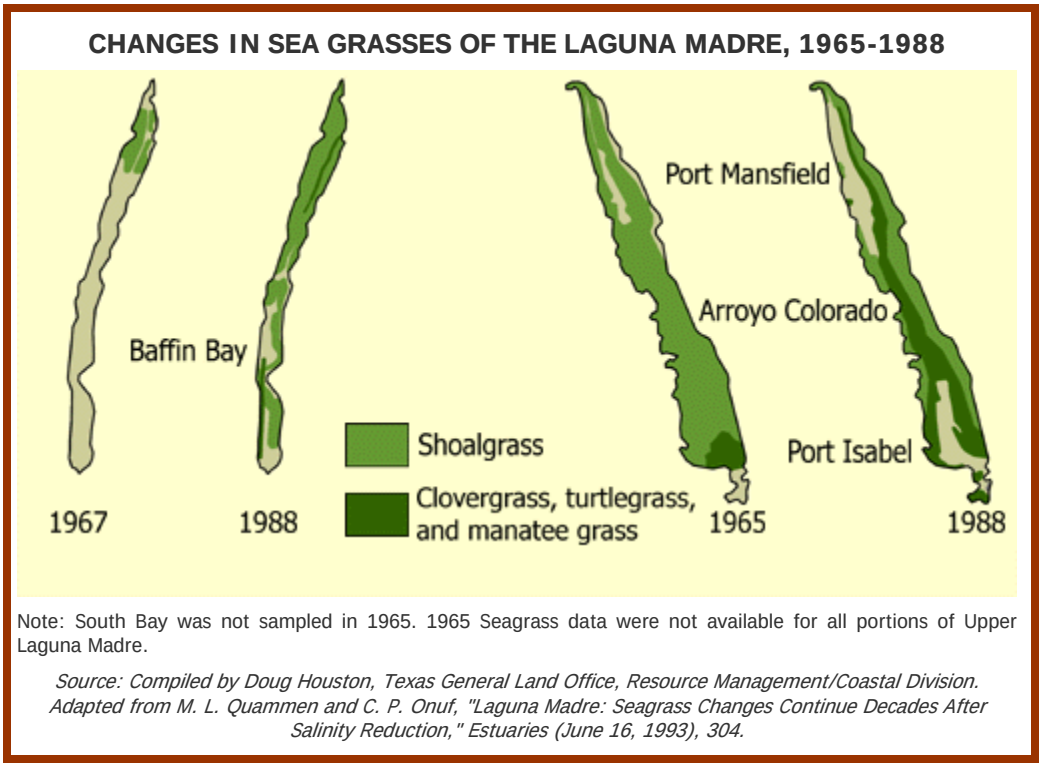
- Subsidence due to extraction of groundwater, oil and gas, sulfur, and other materials.
- Hydrological alterations by canals, spoil banks, roads, and groundwater withdrawals.
- Sediment diversion by dams, deep channels, and other structures.

Natural Causes

- Subsidence (including natural rise of sea level)
- Droughts
- Hurricanes
- Erosion
- Muskrat, nutria, grasscarp, and goose "eat outs"

Source: Tom Calnan, Comprehensive Strategies for Protecting Coastal Wetlands (Austin: Texas General Land Office, 1994).

Figure 28: Causes of Coastal Wetland Loss



Note: South Bay was not sampled in 1965. 1965 Seagrass data were not available for all portions of Upper Laguna Madre.

Source: Compiled by Doug Houston, Texas General Land Office, Resource Management/Coastal Division. Adapted from M. L. Quammen and C. P. Onuf, "Laguna Madre: Seagrass Changes Continue Decades After Salinity Reduction," Estuaries (June 16, 1993), 304.

Figure 29: Changes in Sea Grasses of the Laguna Madre, 1965-1988

3.7 US ARMY CORPS OF ENGINEERS FLOOD PREVENTION PROJECT

The following news release dated August 18, 2006 describes the proposed project that has been partially authorized by WRDA 2008:

The Lower Colorado River Authority was the local sponsor for the US Army Corps of Engineers Flood Damage Prevention Project to identify Federal Flood Protection measures that can mitigate the impacts of flooding along the Colorado River. The Corps of Engineers Study addressed flooding on:

- Onion and Williamson Creek Watersheds in and around Austin, Texas
- Flood Damage Reduction in the City of Wharton, Texas

Matagorda County and the cities of Bay City and Palacios support the project that will reduce flood damages in Matagorda County. The Public Meeting held in the City of Wharton, September 14, 2006 described the proposed project:

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF: August 18, 2006

Planning, Environmental, and Regulatory Division

JOINT PUBLIC NOTICE
NOTICE OF AVAILABILITY
U.S. ARMY CORPS OF ENGINEERS, FORT WORTH DISTRICT
Lower Colorado River Basin Phase I, Texas
Volume I – Project Summary
Volume II – Onion Creek Interim Feasibility Report and Integrated Environmental Assessment and
Volume III – Wharton Interim Feasibility Report and Integrated Environmental Assessment

WATER QUALITY CERTIFICATION
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Interested parties are hereby notified that the U.S. Army Corps of Engineers (Corps), Fort Worth District has prepared a draft Lower Colorado River Basin Phase I, Texas Project Report, which is proposing to implement a project addressing proposed activities to provide flood damage reduction, ecosystem improvement, and recreation in the Onion and Williamson Creek Watersheds in and around Austin, Texas (Volume II), and a project addressing proposed activities to address flood damage reduction in the city of Wharton, Texas (Volume III) within the Lower Colorado River Basin, Colorado River, Texas. The Corps is also requesting water quality certification from the Texas Commission on Environmental Quality (TCEQ) under Section 401 of the Clean Water Act (CWA) for both of these projects.

Authority. This Notice of Availability is being issued to interested parties in accordance with the National Environmental Policy Act (NEPA) of 1969, Public Law 91-190, as amended, and the implementing regulations in Engineering Regulation 200-2-2.

Purpose and Background. The Onion Creek and Wharton projects are a result of a Lower Colorado River Basinwide Study which recommended detailed studies in the two study areas in order to address water related resource problems and opportunities including flood damage reduction, ecosystem restoration and recreation in Onion and Williamson Creeks in Austin, Texas and within the city of Wharton, Texas. A *Final Programmatic Environmental Impact*

Statement, Flood Damage Reduction and Ecosystem Restoration, Lower Colorado River Basin, Colorado River, Texas August 2005 (PEIS) was conducted during the basin wide study effort. Both Volume II and III are interim feasibility reports and integrated environmental assessments (EA) tiered to the PEIS. The study area for the Onion Creek Project is the Onion Creek and Williamson Creek Watersheds, which were further refined to the Timber Creek, Onion Creek Forest/Yarrabee Bend, Bluff Springs Road/Perkins Valley, Onion Creek Subdivision, and Bear/Onion Confluence areas of interest. These areas of interest incur extensive flooding, have latent demand for recreation and are in need of ecosystem restoration measures to restore degraded natural resources. The study area for the Wharton Project is primarily the city limits of Wharton, Texas. However, some project features reduce flooding and are located in Matagorda County. The city of Wharton incurs extensive flooding throughout virtually the entire city.

Proposed Actions and Alternatives. In addition to the No Action, structural, non-structural and combined project alternatives are presented in the Timber Creek, Onion Creek Forest/Yarrabee Bend, Bluff Springs Road/Perkins Valley, Onion Creek Subdivision, and Williamson Creek areas of interest and the Wharton study area. The action alternatives were developed in accordance with the Principles and Guidelines (P&G), which followed the principles, standards, and procedures outlined in the Water Resources Council's "Economic and Environmental Principles and Guidelines for Water Related Land Resources Implementation Studies".
Under the No Action Alternative, which is equivalent to the description of the future without-project condition, no measures would be taken to address the objectives and goals developed for flood protection, ecosystem restoration, or recreation.

The Recommended Plan for the Onion Creek project did not include proposed alternatives to be implemented in the Bluff Springs Road/Perkins Valley, Onion Creek Subdivision and Bear/Onion Confluence areas of interest because of the lack of Federal interest due to inferior benefit-to-cost ratios for flood damage reduction projects. Under the Recommended Plan the Timber Creek and Onion Creek Forest/Yarrabee Bend study areas would consist of the acquisition and removal of 81 and 410 residential structures, respectively in the 4% (25-year) annual chance of exceedance (ACE) floodplain; permanent closure of several streets or parts thereof; restoration of 16 and 190 acres of land to riparian woodlands; and installation of recreation features such as picnic shelters, hiking trails, restrooms, and supporting infrastructure. The Recommended Plan for the Williamson Creek area of interest would consist of channel excavation on one side or the other of the creek to create a benched effect for approximately 8,500 linear feet of creek in four separate reaches; and restoration of 114 acres of land to riparian woodlands.

The Recommended Plan in Timber Creek and Onion Creek Forest/Yarrabee Bend would consist of buyouts and would not affect Waters of the United States or require mitigation. The Recommended Plan in the Williamson Creek Area of Interest would impact approximately 15 acres and 6.02 AAHU of riparian woodlands and impact 8,500 feet of Waters of the United States. Approximately 23 acres of mitigation is proposed, which would provide 7.22 AAHU of habitat improve 4,000 feet of Waters of the United States. The Recommended Plan would be fully mitigated by the proposed mitigation plan.

The Recommended Plan for the Wharton project consists of structural features in the form of earthen levees and accompanying sumps, floodwalls, a channel enlargement, storm drain type drainage structures and an open cut ditch. Most of the project features would be implemented into three different drainage areas: Colorado River, Baughman Slough and Caney Creek. The Recommended Plan associated with the Colorado River would include the construction of 20,310 feet of levees, 19,010 feet of floodwalls and seven sump areas. The seven sumps would occupy 120 acres. Recommended features in Baughman Slough would include 6,610 feet of levees, 380 feet of floodwalls, 4,780 feet of channel modification and two sump areas. The two sumps would occupy approximately 43 acres. Recommended features in Caney Creek would include placement of reinforced concrete pipes and approximately 10,700 feet of open cut ditch.

Implementation of the Recommended Plan in Wharton would result in impacts including approximately 65 acres of riparian/hardwood forests (148 average annual habitat units (AAHU) using 4 species), 129 acres of grassland (193 AAHU using 3 species) and 10 acres of wetlands (12 AAHU using 3 species). The recommended mitigation plan calls for all habitat mitigation to be placed on project sump lands. Approximately 145 acres could be used to create replacement forest, shrub and native prairie habitat. Approximately 40 acres could be used to create replacement wetland habitat. The recommended mitigation plan would generate approximately 256 AAHU of forest habitat and 66 AAHU of wetland habitat. This is well over the required mitigation ratio of 1:1 to fully compensate for project impacts. The mitigation may be revised in the detailed design phase and would be coordinated with resource agencies.

Public Meeting. Public Meetings have been scheduled for both project areas. The meeting for the Williamson Creek area of interest is schedule for September 7th, 2006 at 7:00 p.m. at Woodlawn Baptist Church, 4600 Manchaca Road, Austin, Texas 78745. The meeting for the Onion Creek areas of interest is scheduled for September 13th, 2006 at 7:00 p.m. at Mendez Middle School, 5106 Village Square, Austin, Texas 78744. The meeting for the Wharton Project is scheduled for September 14th, 7:00 p.m. at the Wharton Civic Center, Wharton Texas, 77488.

Copies of the draft Lower Colorado River Basin Phase I, Texas Interim Feasibility Report and Integrated Environmental Assessment Volumes I, II, and III are available for review at the U.S. Army Corps of Engineers, P.O. Box 17300, 819 Taylor Street, Fort Worth, Texas 76102-0300. Copies have also been distributed to the Pleasant Hill Library at 211 East William Cannon Drive Austin, Texas 78745 and the Matagorda County Library at 1920 North Fulton Wharton, Texas 77488. The documents are also available for review on the Fort Worth District Internet Home Page at http://www.swf.usace.army.mil/ and the project website at http://www.fdep.org.

Water Quality Certification. This project would result in a direct impact of greater than three acres of waters of the state or 1,500 linear feet of streams (or a combination of the two is above the threshold), and as such would not fulfill Tier I criteria for the project. Therefore, Texas Commission on Environmental Quality (TCEQ) certification is required. Concurrent

with the processing of this Department of the Army project, the TCEQ is reviewing this project under Section 401 of the Clean Water Act, and Title 30, Texas Administrative Code Section 279.1-13 to determine if the work would comply with State water quality standards. By virtue of an agreement between the USACE and the TCEQ, this public notice is also issued for the purpose of advising all known interested persons that there is pending before the TCEQ a decision on water quality certification under such act.

Any comments concerning this request for water quality certification may be submitted to TCEQ, 401 Coordinator, MSC-150, P.O. Box 13087, Austin, Texas 78711-3087. The public comment period for the water quality certification request extends 30 days from the publication of this notice. A copy of the public notice with a description of the work is made available for review in the TCEQ's Austin office. The complete project information may be reviewed in the USACE's office. The TCEQ may conduct a public hearing to consider all comments concerning water quality if requested in writing. A request for a public hearing must contain the following information: the name, mailing address, application number, or other recognizable reference to the application; a brief description of the interest of the requestor, or of persons represented by the requestor; and a brief description of how the application, if granted, would adversely affect such interest.

The draft reports will be available for public review for 30 days from the date of this notice. Comments or other inquires should be addressed to: Mr. Elston Eckhardt, Project Manager, at U.S. Army Corps of Engineers, Attention: CESWF-PER-P, P.O. Box 17300, Fort Worth, Texas 76102-0300, telephone (817) 886-1861.

William Fickel, Jr.
Chief, Planning, Environmental, and
Regulatory Division

Newman/1762
PAXTON, CESWF-PER-EE
HARBERG, CESWF-PER-E
CRAIG, CESWF-PER-P
BROOKS, CESWF-PM-C
CHURCH, CESWF-PA
CROSSWHITE, CESWF-OC
FICKEL, CESWF-PER

The USACE Chief's Report dated December 31, 2006, officially approved Phase 1 of the proposed Project.

The following legislation was introduced in Congress in March 2007:

H.R.1495
Water Resources Development Act of 2007 (Introduced in House)

SEC. 1001. PROJECT AUTHORIZATIONS.
Except as otherwise provided in this section, the following projects for water resources development and conservation and other purposes are authorized to be carried out by the Secretary substantially in accordance with the plans, and subject to the conditions, described in the respective reports designated in this section:

(38) LOWER COLORADO RIVER BASIN PHASE I, TEXAS- The project for flood damage reduction and environmental restoration, Lower Colorado River Basin Phase I, Texas, Report of the Chief of Engineers dated December 31, 2006, at a total cost of $110,730,000, with an estimated Federal cost of $69,640,000 and an estimated non-Federal cost of $41,090,000.

3.8 CAPITAL IMPROVEMENT PROJECTS

Drainage Improvement Projects

The Matagorda County Consolidated Reclamation and Drainage District initiated four (4) projects in 2009: (1) Tres Palacios River Study and remapping; (2) Conversion of the Lower Colorado River Flood Damage Reduction Study into FEMA quality 100-year and 500-year floodplain mapping for 39.82 miles of the Colorado River in Matagorda County; (3) Levee inspection and evaluation for the Town of Matagorda Levee and 42.05 miles of Colorado River levee through Bay City; and (4) Survey project to establish 5 new bench marks in Matagorda County referenced to NAVD 1988 datum, the new FEMA mapping datum.

Wharton County initiated the Wharton County Mater Drainage Plan in 2006 that studies streams that flow into Matagorda County. There has been an ongoing coordination effort underway since 2006 between Wharton County and the Matagorda County Drainage Districts.

The Wharton County Drainage Master Plan will include:

- The San Bernard River, Middle and West Bernard Creeks and Peach Creek including Baughman's Slough
- East, West, and Middle Mustang Creeks
- Caney Creek downstream of the City of Wharton
- Jarvis Creek
- Waterhole Creek
- Gardner Slough
- Blue Creek downstream of the City of El Campo
- Tres Palacios Creek downstream of the City of El Campo
- Jones Creek

3.9 IMPACT OF FLOODING

FEMA published a total of forty four (44) Matagorda County FIRM Panels and six (6) Flood Boundary Floodway Panels in Matagorda County and the cities of Bay City and Palacios that are listed in Section 2.1.

FEMA published Flood Insurance Studies for Matagorda County, dated May 4, 1992; Bay City dated June 5, 1985 and the City of Palacios dated May 5, 1986 that describes the hydrologic and hydraulic analysis conducted for the streams and coastal areas in Matagorda County. FEMA established the 10-, 50-, 100-, and 500- year flood profiles, base flood elevations, floodways and floodplain boundaries for all streams studied by detail H&H methods. The remaining streams were studied by approximate H&H methods and mapped showing the approximate boundary of the 1% Chance or 100-year flood. Coastal areas in Matagorda County were studied and mapped showing coastal high hazard areas associated with the 100-year storm surge.

Matagorda County and the cities of Bay City and Palacios have adopted Flood Damage Prevention Ordinances to regulate development within designated flood prone areas.

FEMA established the CRS Program to recognize a community's efforts to minimize flood losses. The Matagorda County Flood Mitigation Plan was prepared following FEMA's CRS planning criteria establishing eligibility for Matagorda County and the cities of Bay City and Palacios to enroll in the CRS Program. Matagorda County and participating communities continue to encourage the purchase of flood insurance as a mitigation measure. Flood insurance policies are available to all residents in Matagorda County. Matagorda County and the cities of Bay City and Palacios actively support the TCRFC public outreach and flood damage reduction programs.

4.0 GOALS (CRS ACTIVITY 511.6)

Matagorda County and the cities of Bay City and Palacios are all active participants in the TCRFC and TFMA. The Matagorda County Flood Mitigation Planning Committee incorporated the TCRFC mission statement, goals and objectives into the Flood Mitigation Plan.

The TCRFC established the following mission statement:

"Encourage comprehensive consistent management of the floodplain along the Colorado River and its tributaries; provide a forum for data exchange; and facilitate a structured approach to managing the complex issues related to floodplain management."

The TCRFC Goals are:

- Prevent and reduce flood damage
- Increase State and Federal funding to the region for solutions
- Increase public awareness on flood issues
- Encourage robust, coordinated local regulation
- Provide basinwide coordination among local programs

TCRFC Specific Floodplain Management Goals

- Cooperative arrangement for floodplain management.
- Mechanism for sharing ideas and programs.
- Assist local government with technology, emergency management, training.
- Have a single entity partner with which State and Federal agencies can correspond.
- Current FIRMs - Countywide.
- Public Education

TCRFC Floodplain Management Technical Objectives

- Adopt uniform standards for development.
- Create and maintain accurate and current base mapping.
  - Benchmarks
  - Corporate boundaries
  - Roads
  - Streams
- Review and comment on Letters of Map Changes (LOMCs).
  - Facilitate access to approved LOMCs.
- Maintenance of current H&H models.
- Update Zone A to establish BFE & floodways.

TCRFC Emergency Management Objectives

- Facilitate local floodplain management and emergency management program coordination.
- Coordinate federal, state, and local resources and programs
- Project Impact, HMGP, Flood Mitigation Assistance Program (FMAP), Challenge 21, National Pollutant Discharge Elimination System (NPDES), and Increased Cost of Compliance (ICC)
- Help local communities meet state requirements for emergency response.
- Facilitate a "flood preparedness plan" annex.
- Promote emergency communication/notification - NOAA, LCRA radios, local media.

TCRFC Training Objectives

- Train new member communities prior to joining Coalition.
- Coordinate state and federal training programs.
- Technical training for floodplain and emergency management staff.
- Training for consistent hydrologic/hydraulic modeling.
- Training for stakeholders (Insurance, Lenders, Surveyors, and developers).
- Policy Training for local officials.
- Public Awareness.
- Maintain a resource pool of Mutual Aid Trainers/Emergency Response Personnel.

TCRFC Legislative/Legal/Funding Objectives

- Work with Council Of Governments.
- Develop and manage annual budget - Administrative.
- Identify and pursue additional funding for diversified sources.
- Review and educate lawmakers on related legislative issues as a coalition and via lobbyists associated with other agencies.
- Assist with solicitation of federal funds for capital projects.

Through implementation of the following activities, flood hazard mitigation will be realized to reduce the threat to citizen's health and safety, and to reduce property damage caused by floods. Flood mitigation planning will improve the lives of the citizens of Matagorda County and the environment.

CRS Activities

1. Evaluate the benefits of enrolling in FEMA's CRS Program
2. Review FEMA's Repetitive Loss List annually and submit data to FEMA.
3. Improve CRS Classifications annually.

Drainage Projects

1. Support the Matagorda County Consolidated Reclamation and Drainage District floodplain mapping and drainage improvement projects.
2. Secure funding for design and construction of drainage improvement projects identified in the Matagorda County Conservation and Reclamation District Drainage Study.

Floodplain Management

1. Evaluate the remaining (non-mitigated) Repetitive Loss and Severe Repetitive Loss Properties within Matagorda County and participating communities for future Flood Mitigation Assistance (FMA) and Hazard Mitigation Grant Program (HMGP) Projects focused on acquisition, relocation and or elevation projects.
2. Establish additional Elevation Reference Marks to create county-wide coverage based on NAVD 88.
3. Encourage local citizens and business owners to purchase flood insurance on both the structure and contents of properties located within Matagorda County and the cities of Bay City and Palacios.
4. Revise building requirements if necessary to minimize flood damage to new construction.
5. Review the current flood damage prevention ordinances and evaluate current requirements to elevate new construction a minimum of one foot above the Base Flood Elevation (BFE).
6. Coordinate with FEMA and revise flood damage prevention ordinances to reference future revisions to the Matagorda County DFIRMs.

Property Protection

1. Increase awareness for the need to purchase Flood Insurance for properties located in Matagorda County and the cities of Bay City and Palacios. In the survey, conducted as part of the Flood Mitigation Plan preparation, 86% of citizens responding know that they live in a designated flood hazard zone. See Plan Section 1.3.2. The Texas Colorado River flood Coalition (TCRFC) TIMS can assist in helping inform the public by having an interactive map that people can easily use to help find their home or place of business to see if it is in a flood zone. TIMS has an option of entering an address to help the user find the specific site. TIMS can be found on the following link: http://tims.lcra.org/Launch.aspx
2. Matagorda County and the cities of Bay City and Palacios are subject to flooding from extreme coastal storms resulting from intense rainfall and overflows from the Colorado River, Tres Palacios River and other tributaries. Matagorda County and the cities of Bay City and Palacios are enrolled in the National Flood Insurance Program and flood insurance is available for all structures located in Matagorda County. Flood insurance is a citizen's first line of defense to offset flood losses. Matagorda County and the cities of Bay City and Palacios have instituted measures to become more disaster resistant however the Flood Mitigation Planning Committee recommends that all property owners in Matagorda County consider purchasing flood insurance regardless of what flood zone their property is located in. Matagorda County and the cities of Bay City and Palacios should each continue to support public awareness efforts to inform citizens of the protection that can only be provided by purchasing flood insurance coverage for structures and their contents.
3. Conduct an annual evaluation of FEMA's Repetitive Loss List to prioritize and identify potential acquisition/relocation and elevation projects. Submit repetitive loss update information to FEMA.
4. Prepare Cost Estimates for future acquisition/relocation and elevation projects.
5. Educate the public on elevation of structures in addition to acquisition and relocation of flood prone structures. Utilize FMA and HMGP funding to elevate structures in lieu of acquisition.
6. Conduct an annual evaluation and update of the Matagorda County section of the TCRFC "All Hazards Mitigation Plan" and cooperate with the Texas Division of Emergency Management (TDEM) to maintain and update the county-wide "all hazards" plan. (TDEM and FEMA require that all hazard plans be reviewed annually and updated every five-years)
7. In response to the Flood Insurance Reform Act of 2004, cooperate with FEMA for the pilot program to mitigate "Severe Repetitive Loss Properties" located in Matagorda County and the cities of Bay City and Palacios.

Matagorda County Flood Mitigation Goals

After review of the TCRFC Regional Mitigation Plan Goals, a total of eighteen (18) Flood Damage Reduction Planning Goals were established by the Matagorda County Flood Mitigation Planning Committee.

Flood Damage Reduction Goals (F)

Addresses: Flooding
Goal: Make Matagorda County more flood resistant by:

F-1 Reduce flood losses and increase flood insurance coverage in Matagorda County.
[Non structural measure to reduce the burden of future flood losses]

F-2 Design, construct and maintain drainage improvement projects that minimize the risk of loss of life and future flood damages.
[Structural measure to minimize future loss of life and flood damages.]

F-3 Acquisition or elevation of repetitive loss and floodprone properties.
[Structural measure to reduce the number of repetitive loss properties in Matagorda County.]

F-4 Floodplain mapping for unmapped streams in Matagorda County
[Non structural measure to minimize future flood damages.]

F-5 Adopt "higher standard" riverine flood damage prevention ordinances and standards.
[Non structural measure to minimize future flood damages.]

F-6 Adopt "higher standard" coastal flood damage prevention ordinances and standards.
[Non structural measure to minimize future flood damages.]

F-7 Provide training for community floodplain managers, community emergency managers, CFM's and CEM's.
[Non structural measure to educate city staff to improve floodplain management and minimize future flood damages.]

F-8 Develop funding opportunities for drainage system improvements
[Structural and non structural measures to minimize future flood damages.]

F-9 Establish county-wide benchmark network
[Non structural measure to minimize future flood damages.]

F-10 Support future Colorado River and Tres Palacios River flood reduction projects
[Structural measure to minimize future flood damages.]

F-11 Participation in FEMA's Community Rating System (CRS) Program.
[Non structural measure to encourage sound floodplain management and minimize future flood damages.]

F-12 Create the Matagorda County Disaster Response Team
[Measure to reduce losses from future disasters by accurately documenting public infrastructure and private property damages, establishing high water marks, properly permitting repairs to damaged structures, coordination with Federal and State Disaster Response forces, and designing and constructing facilities to minimize damages from future events.]

F-13 Installation of additional stream gauges in the Colorado and Tres Palacios watersheds
[Non structural measure to save lives and minimize future flood damages.]

F-14 Install Reverse 911 Emergency Warning System
[Non structural measure to save lives and minimize future flood damages.]

F-15 Storm Ready designation for Matagorda County communities
[Non structural measure to save lives and minimize future flood damages.]

F-16 Backup power for Matagorda County critical facilities
[Structural measure to save lives and minimize flood damages by increasing capabilities to respond to disasters.]

F-17 Inspect, Improve and Certify flood protection levees and seawalls in Matagorda County
[Structural measure to minimize future flood damages.]

F-18 Cottonwood Creek LOMR in Bay City
Non structural measure to reduce flood insurance premiums in Bay City]

5.0 REVIEW OF POSSIBLE ACTIVITIES (CRS ACTIVITIES 511.7)

Many of the following alternatives were drawn from the Matagorda County Consolidated Reclamation and Drainage District Project and the TCRFC HAZMAP Plan:

- "Structural" Alternatives
  - Detention and retention ponds
  - Dredging and clearing
  - Levees, seawalls, revetments and dams
  - Ditches and culverts
  - New Bridges
  - Construct new critical facilities above the 500-year flood level

- "Non-Structural" Alternatives
  - (FEMA) National Flood Insurance Program
    - » Identify flood areas and depths
    - » Buy-out of buildings most prone to flood
    - » Elevate new buildings (BFE +1, 2, 3 and in Zone X)
    - » Provide insurance for existing public buildings
    - » Delineate Floodways (existing and future conditions)
    - » Establish Floodway Setbacks
    - » Install additional BM's (NAVD 1988)
- County Standards
  - Creek maintenance (Structural)
  - Development practices (Non-Structural)
    - » Practices
    - » Ordinances
    - » Policies

The Texas Colorado River Floodplain Coalition (TCRFC) recommendations are as follows:

- Increase funding for State technical assistance by the TWDB to local floodplain and emergency management programs;
- Establish and fund a State floodplain mapping program, including required engineering studies;
- Increase TWDB funding programs for flood control studies and allow funding of related projects;
- Decrease the 50% matching funds requirement for small and rural communities; and
- **Redirect a portion of the State tax on new flood insurance premiums.**

The 2004 TCRFC "All Hazards" Mitigation Plan was prepared by the Texas Colorado River Floodplain Coalition to address known hazards throughout the LCRA Basin including Matagorda County. Matagorda County and the cities of Bay City and Palacios participated in the TCRFC planning effort and provided technical information to be included in the TCRFC Plan. The TCRFC All Hazards Mitigation Plan mitigation actions were evaluated by the Matagorda County Flood Mitigation Planning Committee to be included in the Matagorda County Flood Mitigation Plan. The Flood Mitigation Planning Committee identified the following activities to be included in the Flood Mitigation Plan:

5.1 PREVENTIVE ACTIVITIES (CRS ACTIVITY 511.7.A)

Open Space Preservation

There are 1,738 acres of pristine coastal wetlands preserved as open space in Matagorda County in the following three parks:

FM 521 Park is a 13-acre park developed by the LCRA and operated by Matagorda County. It is four miles west of Wadsworth on FM 521. The facilities include picnic sites, chemical toilet, playground, fishing pier and group pavilion. A boat ramp allows for launching of canoes, kayaks and light watercraft.

Matagorda Bay Nature Park is a 1,600-acre park and preserve at the mouth of the Colorado River on the Matagorda Peninsula. LCRA developed the park to provide recreation, education, wetlands preservation and economic benefit to the region.

The park has about two miles of Gulf of Mexico and two miles river frontage and hundreds of acres of coastal marshes and dunes. It is one of the "best birding areas in the nation". LCRA acquired the property in 2001 as part of its commitment to preserve natural resources for future generations and to provide science education, recreation and nature tourism opportunities.

Texas State Marine Education Center (TSMEC)

TSMEC is a 125 acre educational facility located in Matagorda County on Tres Palacios Bay, an inlet of Matagorda Bay, off the Gulf of Mexico. Palacios is 110 miles southwest of Houston, 110 miles northeast of Corpus Christi, and 175 miles southeast of Austin. The TSMEC Palacios Independent School District (PISD) K-12 Program provides supportive education to students and teachers through hands-on marine oriented activities, history and nature studies. The Texas State Marine Education Center is in association with Matagorda County Navigation District No. 1 and Texas State Technical College. Since the Center's beginning in 1988, more than 25,000 youth and adults have benefited from its unique program. Talented staff members have developed over 100 marine-related lessons that allow individuals the opportunity to go into the field to study marine life. The Center's wetlands encompass an estuarine beach, salt-water marsh and coastal prairie. Students learn about erosion, plants, sea life, birds, water quality, pollution, history and a

variety of other topics. TSMEC consists of an administration-classroom building; marine science laboratory; aquaculture-technology laboratory; higher education administration, classroom and laboratory; diesel mechanics laboratory; 708' x 20' pier; 1-1/4 mile nature trail with elevated observatory platform; two 12-passenger teaching vessels; 80+ acres of coastal marsh; and 2,400 linear feet of bay front.

Figure 30: Texas State Marine Education Center (TSMEC)

Floodplain Regulations

Matagorda County and the cities of Bay City and Palacios have adopted floodplain management regulations that exceed the minimum requirements for participation in the National Flood Insurance Program. The FEMA minimum requires elevation at or above the BFE. Matagorda County and the cities of Bay City and Palacios require new construction and substantial improvement to be elevated a minimum of one foot above BFE.

Stormwater Management

Matagorda County and the cities of Bay City and Palacios are responsible for the design, construction and maintenance of the storm drainage system within their jurisdictions. Local ordinances require that prior to development, an analysis must be submitted identifying by plan and profile the means and methods of draining proposed subdivisions. Details showing all existing and proposed subdivision drainage structures, the means and methods of connecting the proposed drainage system into the existing system, and the impact the development will have on major outfall drainage structures are required.

Drainage System Management

The cities of Bay City and Palacios work in conjunction with the four Matagorda County Precincts, Consolidated Reclamation and Drainage District and various Drainage Districts to

design, construct, and maintain drainage systems within each community and the unincorporated areas in the County.

The Tres Palacios River Study underway by the Matagorda County Consolidated Reclamation and Drainage District will identify needed drainage improvements. These needed improvements will be incorporated into the Capital Improvement Program (CIP) projects to be designed and constructed by Matagorda County and the city of Palacios. The four Matagorda County Commissioners maintain the County's storm drainage system to reduce the risk of flooding within the County and adjacent cities to comply with the Non Pollution Discharge Elimination System (NPDES) requirements.

Coastal Barrier Resource Act (CBRA) areas within Matagorda County

Coastal barriers are unique land forms that provide protection for distinct aquatic habitats and serve as the mainland's first line of defense against damage from coastal storms and erosion. Congress recognized the vulnerability of coastal barriers to development by passing the Coastal Barrier Resources Act in 1982 (CBRA). By restricting Federal spending and financial assistance which have the effect of encouraging development of coastal barriers, Congress aimed to reduce the loss of human life, wasteful spending of Federal money, and damage to fish, wildlife, and other natural resources associated with coastal barriers along the Atlantic and Gulf of Mexico coasts. The CBRA, while not forbidding privately financed development, does not allow new Federal financial assistance, including flood insurance, within a designated Coastal Barrier Resources System (CBRS).

In 1990, Congress passed the Coastal Barrier Improvement Act (CBIA). The CBIA tripled the size of the System established by the CBRA. The CBIA also does not allow the issuance of new Federal flood insurance within "otherwise protected areas" on buildings constructed after November 16, 1991, unless the building is used in a manner related to the reason the area is protected. Otherwise Protected Area's (OPA's) are generally used for activities such as fish and wildlife research and refuges.

The Coastal Barrier Resource System (CBRS) laws define the CBRS based on a series of maps drawn by the Department of the Interior (DOI) that depict the specific boundaries of the individual units. The boundaries are not restricted to following roadways, property or political lines; they are based on geographic factors. The DOI source maps are available to the public although they may lack street names and corporate boundaries that flood insurance providers may need to determine whether buildings are located in a CBRS area. In most cases the names given to the geographical areas depicted as being within the CBRS do not correspond to those of participating NFIP Communities.

FEMA Flood Insurance Rate Maps (FIRMs) are published reflecting the CBRS boundaries so that insurance agents and underwriters are able to determine eligibility for flood insurance coverage.

When submitting a new flood insurance policy application or request for quote, insurance agents should consult the NFIP Flood Insurance Manual's listing of communities that have identified

OPA or CBRS areas. If the building is located in a community that is on the list, such as Matagorda County, the agent can then consult the CBRS NFIP Community list that also has the Panel Numbers. This information is available on FEMA's website, www.fema.gov, and through the CBRS NFIP Community ID and Panel Number hard copy list that has been sent to all Flood Insurance Manual Subscribers.

The CBRS NFIP Community ID and Panel Number list should be used in underwriting to alert the agent and/or company that further review is necessary to ensure eligibility for flood insurance coverage. When a policy is being written for a building that is located in a community that has an OPA or CBRS areas, the agent or underwriter can consult the CBRS NFIP Community ID and Panel Number list and;

- If the building is located on a FIRM panel that has CBRS areas, and the building has a date of construction later than the CBRS designation date, and/or has been substantially improved after that date, it will be necessary to locate the building on the appropriate FIRM panel, to determine the location in relation to the CBRS boundary.

OR

- An agent may elect to check eligibility based upon the location first. If it is found that the building's location as shown on the FIRM reveals that it is clearly not in the CBRS, then the date of construction or substantial improvement in relation to the CBRS designation date is not necessary.

Table 6, Coastal Barrier Resource System Map FIRM Panel Information, lists the CBRA areas within Matagorda County.

Table 6: Coastal Barrier Resource System Map FIRM Panel Information

CID	FIPS Code	Community	County	State	Map Number	FIRM Date	CBRS Units on FIRM Panel	Earliest CBRS Date on Map
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890450D	5/4/92	T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890475D	5/4/92	T06, T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890500D	5/4/92	TX-10	11/16/90
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890525D	5/4/92	TX-09	11/16/90
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890555D	5/4/92	T07P	11/16/91

CID	FIPS Code	Community	County	State	Map Number	FIRM Date	CBRS Units on FIRM Panel	Earliest CBRS Date on Map
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890560D	5/4/92	T07P	11/16/91
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890565D	5/4/92	T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890570D	5/4/92	T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890600D	5/4/92	T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890625D	5/4/92	T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890675D	5/4/92	T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890700D	5/4/92	T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890725D	5/4/92	T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890750D	5/4/92	T07, T07P	10/1/83
485489	48321	Matagorda Co. (Uninc. Areas)	Matagorda	TX	4854890775D	5/4/92	T07, T07P	10/1/83

FEMA Website – www.fema.gov (Last Modified: Thursday, 04-Jun-2009 11:50:28 EDT)

5.2 PROPERTY PROTECTION (CRS ACTIVITY 511.7.B)

Relocation / Acquisition

Matagorda County and the cities of Bay City and Palacios are prepared to initiate acquisition and relocation projects funded by the Hazard Mitigation Grant Program (HMGP), the Texas Department of Rural Affairs (TDRA) and other sources.

Timely action has reduced the number of Repetitive Loss Properties in Matagorda County by condemnation of substantially damaged structures following Tropical Storm Claudette (1979) and various successful acquisition and relocation projects. In response to future flood events, Matagorda County and the cities of Bay City and Palacios are prepared to launch acquisition and relocation projects to mitigate properties that are substantially damaged and to take advantage of

both Flood Mitigation Assistance (FMA) Program and HMGP grant funds. In the event of a future Presidential Declared Disaster, and if HMGP and FMA grant funds are made available, repetitive loss properties will be evaluated for potential relocation and/or acquisition projects.

Building Elevation

In lieu of relocation and/or acquisition, a structure may be elevated to minimize flood losses. Various grants and other alternative funding sources may be available for elevation projects. In Wharton County, adjacent to Matagorda County, the City of Wharton has successfully completed two (2) building elevation projects utilizing HMGP funding. Matagorda County and the cities of Bay City and Palacios plan to concentrate on future project funding for "demo-rebuild" projects utilizing both HMGP and FMA Program funding.

One of the Mitigation Actions included in Section 6 of this Plan is for Matagorda County and the cities of Bay City and Palacios to evaluate adoption of additional "higher standards" to be included in the community Flood Damage Prevention Ordinance requiring the lowest floor of new construction to be elevated +2 or possibly +3 feet above the Base Flood Elevation (BFE) posed on the FIRM. This action will not only reduce the risk of flood damages to new construction in Matagorda County it will result in reduced flood insurance policy premiums should Matagorda County, Bay City or Palacios enroll in FEMA's CRS Program. Matagorda County and the cities of Bay City and Palacios currently require new construction to be elevated a minimum of one foot above BFE.

An annual review and update is required for both the TCRFC all-hazards Mitigation Plan and the Matagorda County Flood Mitigation Plan. An annual review of the Matagorda County Repetitive Loss List, maintained by Matagorda County and the cities of Bay City and Palacios, will identify potential acquisition and/or elevation projects. The Repetitive Loss information is confidential (property owners names and addresses) in nature and used for planning purposes and therefore not included in this Plan.

Floodproofing

Local ordinances allow floodproofing of commercial, industrial or other nonresidential structures. Nonresidential structures must be floodproofed a minimum of twelve (12) inches above the base flood elevations as shown on the latest Flood Insurance Rate Map (FIRM). In addition, a registered professional engineer or architect must develop and/or review the structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice. The floodplain administrator for each community maintains records of all floodproofing certificates.

Insurance

The National Hurricane Conference was held in Austin, Texas April 6 to April 10, 2009. The purpose of the conference was to improve hurricane preparedness, response, recovery and mitigation in order to save lives and property in the United States and the tropical islands of the Caribbean and Pacific. The conference served as a national forum for federal, state and local

officials to exchange ideas and recommend new policies to improve Emergency Management.

To accomplish these goals, the annual conference emphasized:

- Lessons Learned from Hurricane Strikes.
- State of the art programs worthy of emulation.
- New ideas being tested or considered.
- Information about new or ongoing assistance programs.
- The ABC's of hurricane preparedness, response, recovery and mitigation -- in recognition of the fact that there is a continual turnover of emergency management leadership and staff.

Representatives from Matagorda County also attended the 2008 Emergency Management Expo held at the Wharton Civic Center June 24, 2008. The one day Expo addressed the needs for flood and wind insurance; hurricane awareness; flooding on the Colorado River; evacuation and crisis response.

The Flood Mitigation Committee recommends that TWDB and the TCRFC continue insurance awareness and outreach programs to encourage citizens to purchase flood insurance policies. This will become a very important activity for communities that elect to enroll in the CRS Program. A CRS Rating of nine (9) provides a discount of five (5) percent to all flood insurance policies held within the CRS community.

5.3 NATURAL RESOURCE PROTECTION (CRS ACTIVITY 511.7.C)

Wetlands Protection

The NFIP Regulations 44 CFR 60.3.a.2 requires a participating community to review proposed development and require that all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334 and the Endangered Species Act (ESA). As part of the application (request) for a Letter of Map Revision based on Fill (LOMR-F) FEMA now requires (MT-1 Form 3) that the local community official certify that no fill has been or will be placed in the regulatory floodway; existing or proposed structures are or will be reasonably safe from flooding; and when there is the potential to impact an endangered species, documentation must be submitted to show compliance with Sections 7, 9 and 10 of the Endangered Species Act (ESA)

Matagorda County and the cities of Bay City and Palacios all participate in the NFIP and have included the language above in their Flood Damage Prevention Ordinances.

The Lower Colorado River Authority is a strong supporter of natural resource protection in the Colorado River Basin. The following information was posted on www.lcra.org:

Promoting Stewardship of Natural Resources in the Colorado River Basin

LCRA's primary responsibility is to serve as a steward of the lower Colorado River. Two fundamental elements of that stewardship mission are protecting the water and lands of the lower Colorado basin and informing the public about how the river affects their lives.

Whether its monitoring water quality or helping students learn about energy efficiency, environmental leadership and public education figure into all of LCRA's diverse roles and lines of business.

Environmental Leadership
LCRA works to protect air quality, water quality and natural resources in Central Texas and brings together a broad range of interests to address environmental issues

Education
LCRA education efforts include natural science programs, leadership training for communities, energy efficiency programs for teachers and students and much more.

Our environmental commitment

Nothing at LCRA is more important than our responsibility to the environment and our commitment to being a respected environmental leader. As a conservation and reclamation district, LCRA is focused by its enabling legislation on the delivery of specific services to the people of Texas. Keeping the environment healthy, safe, usable and enjoyable while delivering those services goes to our very core.
In fact, without our commitment to managing the beautiful Colorado River, LCRA would have no inherent right to exist. It's just that simple. The river is our lifeblood. Ensuring its well-being is our mission.

Still, LCRA has a dual personality because of who we are and what we do. On one hand, as a steward of the Colorado River, we are a dedicated protector of our precious resources; on the other hand, as an electric-generating utility, and as a water and wastewater utility, we are subject to environmental rules.


LCRA former General Manager Joe Beal at the Colorado River near Bastrop.

This double role of protector and regulated entity is a reality that drives the work LCRA employees do every day

Since becoming general manager, I repeatedly have shared my belief that LCRA deserves to be known as an environmental leader on both sides of our business. When it comes to the environment, we are driven to do the right thing. The public must know that our vision is clear, and our employees must know they are accountable.

Toward that end, LCRA's "environmental wheel" went into motion. An Environmental Leadership Policy Implementation Committee developed a plan for accomplishing our Board policy on environmental leadership. The plan recommends tools to educate and inform our employees and the public. As integral parts of LCRA's ongoing work, the specific elements of the plan will drive us to expanded levels of environmental leadership.

In fact, these Web pages and our environmental report, focusing on our successes as well as current and future challenges, is a key part of that action plan. Sharing it publicly reinforces our commitment to environmental leadership.

Throughout its history, LCRA has been a responsible corporate citizen. We have cherished and protected what has been legislated to our safekeeping. We take pride in our record, while still acknowledging the challenges of ever-tightening rules and expectations.

But the proof of LCRA's environmental commitment ultimately is in its performance. We will be judged by our actions.

Sincerely,

Joseph J. Beal, P.E.

Former General Manager

Environmental Assessment and Mitigation of Flood Protection and Drainage Improvement Projects (within Wharton County upstream of Matagorda County)

In September 2006 Public Meetings were conducted to notify interested parties regarding the U.S. Army Corps of Engineers (Corps), Fort Worth District Lower Colorado River Basin Phase I, Texas Project Report, which is proposing to implement a project addressing proposed activities to address flood damage reduction in the city of Wharton, Texas (Volume III) within the Lower Colorado River Basin, Colorado River, Texas. The Corps is also requesting water quality certification from the Texas Commission on Environmental Quality (TCEQ) under Section 401 of the Clean Water Act (CWA) for both of these projects.

Implementation of the Corps Recommended Plan in Wharton would result in impacts including approximately 65 acres of riparian/hardwood forests (148 average annual habitat units (AAHU) using 4 species), 129 acres of grassland (193 AAHU using 3 species) and 10 acres of wetlands (12 AAHU using 3 species). The recommended mitigation plan calls for all habitat mitigation to be placed on project sump lands. Approximately 145 acres could be used to create replacement forest, shrub and native prairie habitat. Approximately 40 acres could be used to create replacement wetland habitat. The recommended mitigation plan would generate approximately 256 AAHU of forest habitat and 66 AAHU of wetland habitat. This is well over the required mitigation ratio of 1:1 to fully compensate for project impacts. The mitigation may be revised in the detailed design phase and would be coordinated with resource agencies.

Erosion and Sediment Control

Matagorda County and the cities of Bay City and Palacios address erosion that occurs on streams and drainage ways in the County. Due to the general flat stream gradients in Matagorda County, riverine erosion is not considered to be a major problem. However coastal erosion for coastal areas in Matagorda County and the City of Palacios is considered to be a major problem. The Texas General Land Office (GLO) has monitored erosion all along the Texas Gulf Coast and the erosion rate in Texas Coastal Region III, that includes the 42.1 miles of Matagorda Peninsula frontage on the Gulf Coast varies from -24.8 feet per year at the Matagorda/Brazoria County boundary to -1.8 feet per year at Sargent Beach to -14.6 feet per year at the mouth of Matagorda Bay. The average home loan is 30 years and the average structure life is approximately 50 years, therefore the life expectancy of a coastal structure can be reduced significantly when the rate of erosion is extreme. This problem is magnified in coastal areas exposed to high erosion rates because the NFIP regulations (44CFR), which must be adopted by a participating community, do not properly address the erosion risk to coastal properties. Should Matagorda County and the City of Palacios, both with coastal areas within their jurisdiction, enforce mandatory development setbacks in high erosion areas, this may be construed as a “takings” and property owners could demand to be reimbursed for loss of development rights. Only Federal or State legislation could remedy the problem where coastal construction is exposed to high erosion rates. In the meanwhile, Matagorda County and Palacios floodplain ordinances, approved by FEMA, do not prohibit development in areas subject to coastal erosion.

The Federal Flood Control Project proposed by the USACE and LCRA will include structural mitigation protection projects to alleviate erosion problems on the Colorado River and tributaries.

Coastal erosion along the Texas Gulf Coast has been well documented by the Texas General Land Office. Hurricane Ike, September 2008, is the latest major erosion event on the Gulf Coast and the storm relocated the Line of Vegetation (LOV) impacting 100's of structures in Galveston County and adjacent areas.

Figure 31, Critical Erosion in Region III, shows the average annual shoreline change rate in linear feet per year along Matagorda Peninsula. This extreme rate, up to 28.4 feet per year loss places the protection element of the Matagorda Peninsula (barrier island) in jeopardy should this extreme rate continue.

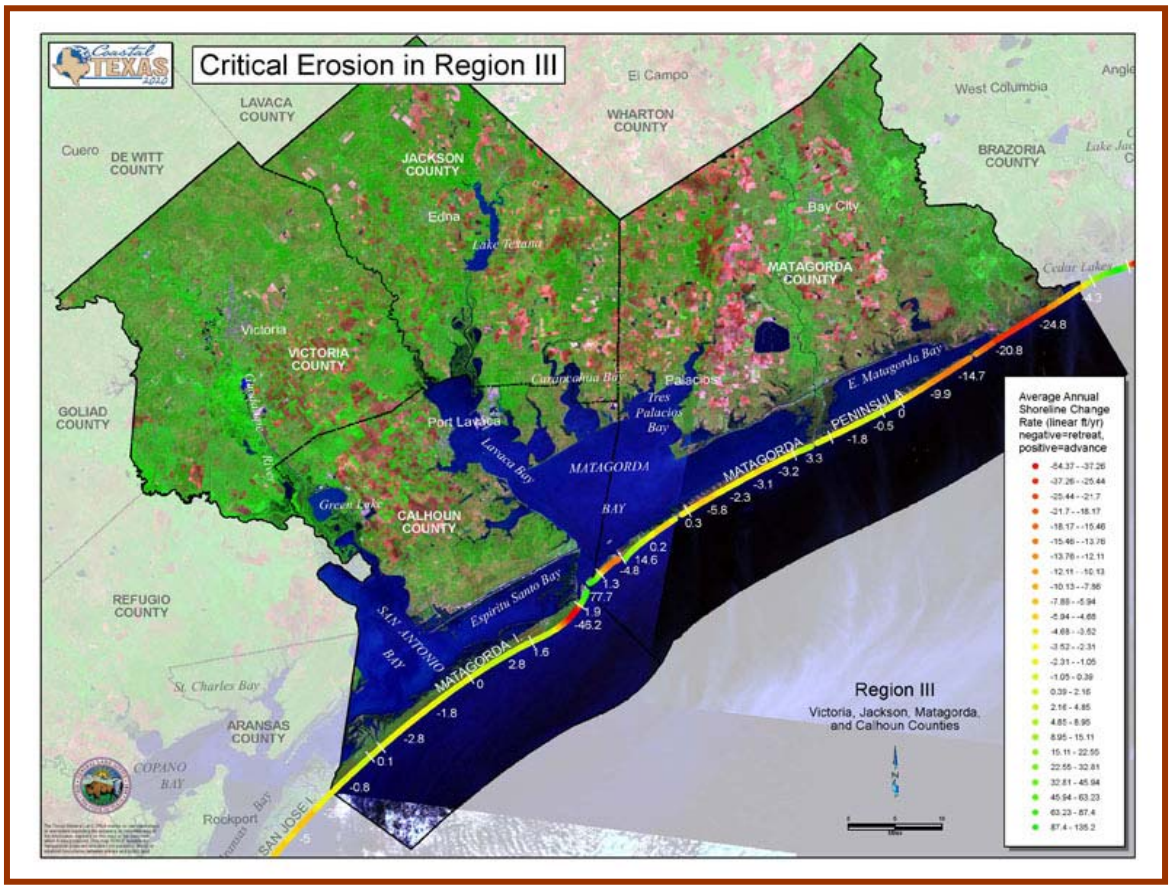


Figure 31: Critical Erosion in Region III (Texas Gulf Coast)

Best Management Practices

The Code of Ordinances for Matagorda County and the cities of Bay City and Palacios outlines the best management practices for the protection of natural resources. In Matagorda County coastal areas, along the Gulf of Mexico, the Texas General Land Office (GLO) enforces the Texas Open Beaches Act, Dune Protection Act, and Coastal Erosion Protection and Response

Act (CEPRA). The GLO coordinates beach restoration projects with the US Army Corps of Engineers to place materials dredged from the Gulf Intracoastal Waterway and offshore areas in the Gulf of Mexico.

Matagorda County and the city of Palacios issues coastal construction permits following GLO guidelines.

5.4 EMERGENCY SERVICES (CRS ACTIVITY 511.7.D)

Flood Warning

In 2007, the LCRA installed a new rain gauge in Matagorda County to improve flood warning in Matagorda County and published the following news release that is also posted on the LCRA website, www.lcra.org:

New Rain Gauge in Matagorda County Provides Weather Data

For Immediate Release: October 19, 2007 02:00 PM

MIDFIELD – This community near the Tres Palacios River is the latest link in the network of river and weather gauges operated by the Lower Colorado River Authority to improve flood information and forecasting during floods and storms.

Every 15 minutes, the weather gauge automatically feeds data on precipitation, temperatures and humidity to a central computer in Austin, where hydrologists in LCRA's River Operations Center forecast lake levels and make decisions on operating floodgates at dams.

Bob Watts, emergency management coordinator for Matagorda County, said the gauge will help officials provide early warnings to an increasing number of residents who live along and near the Tres Palacios. “Anytime you get the most current readings it helps us be prepared in case we need to warn people downstream,” Watts said.

The Midfield station is one of 252 gauges in the lower Colorado River basin as part of LCRA’s Hydromet system (short for Hydrometerological Data Acquisition System). The expanding gauge network is designed to improve the organization’s ability to respond when a flood strikes in the lower Colorado River basin -- one of the most flood-prone regions of the United States.

Most of the weather and stream flow gauges are located in the upper parts of the region, along the Highland Lakes and its tributaries, and in the Hill Country, where the basin is widest and flash floods are most common. But the narrow stretches of the lower basin also are subject to floods, and the Tres Palacios River area is the most flood-prone area of Matagorda County, local officials said.

Matagorda County Judge Nate McDonald said even a moderately heavy rainfall can cause flooding along the Tres Palacios and make some local roads impassable. “I anticipate this will help in giving an early warning to our folks,” McDonald said.

The Midfield gauge represents a cooperative effort between the county and LCRA. Matagorda County officials donated land for the $15,000, battery-operated gauge, which includes a computer

and communications equipment to remotely transmit information to a central computer in Austin. The public can monitor the information on the Internet at http://hydromet.lcra.org.

Sean Maijala, LCRA's supervisor of Hydromet Operations, said the gauge fills a potential gap in the network during heavy rainfalls and fast-moving tropical storms. The information provides another data point that LCRA hydrologists can use during floods as they work to safely release water from the dams that form the Highland Lakes northwest of Austin. "It helps in fine-tuning activity in the lower basin," Maijala said.

County Commissioner David Woodson, who lives just blocks from the new gauge in the heavily agricultural region, said he sees an additional benefit -- for farmers.

"Instead of driving, farmers who live 30, 40 miles away in El Campo and Louise can get on the Web and see how much rain they got on land they farm in that area," he said.

An example of a flood warning mitigation action is installation of automated flood warning devices on roadways at low water crossings. The following photos, Figures 11 and 12, describe the Watermark Safety Mark V Highway Automated 'flood gauge' warning system in Boerne, Texas on San Antonio Street. The computer system was not able to record (maxed out) with approximately 8 inches of water on September 5, 2006.

Figure 32: Flood Gauge - Boerne, Texas

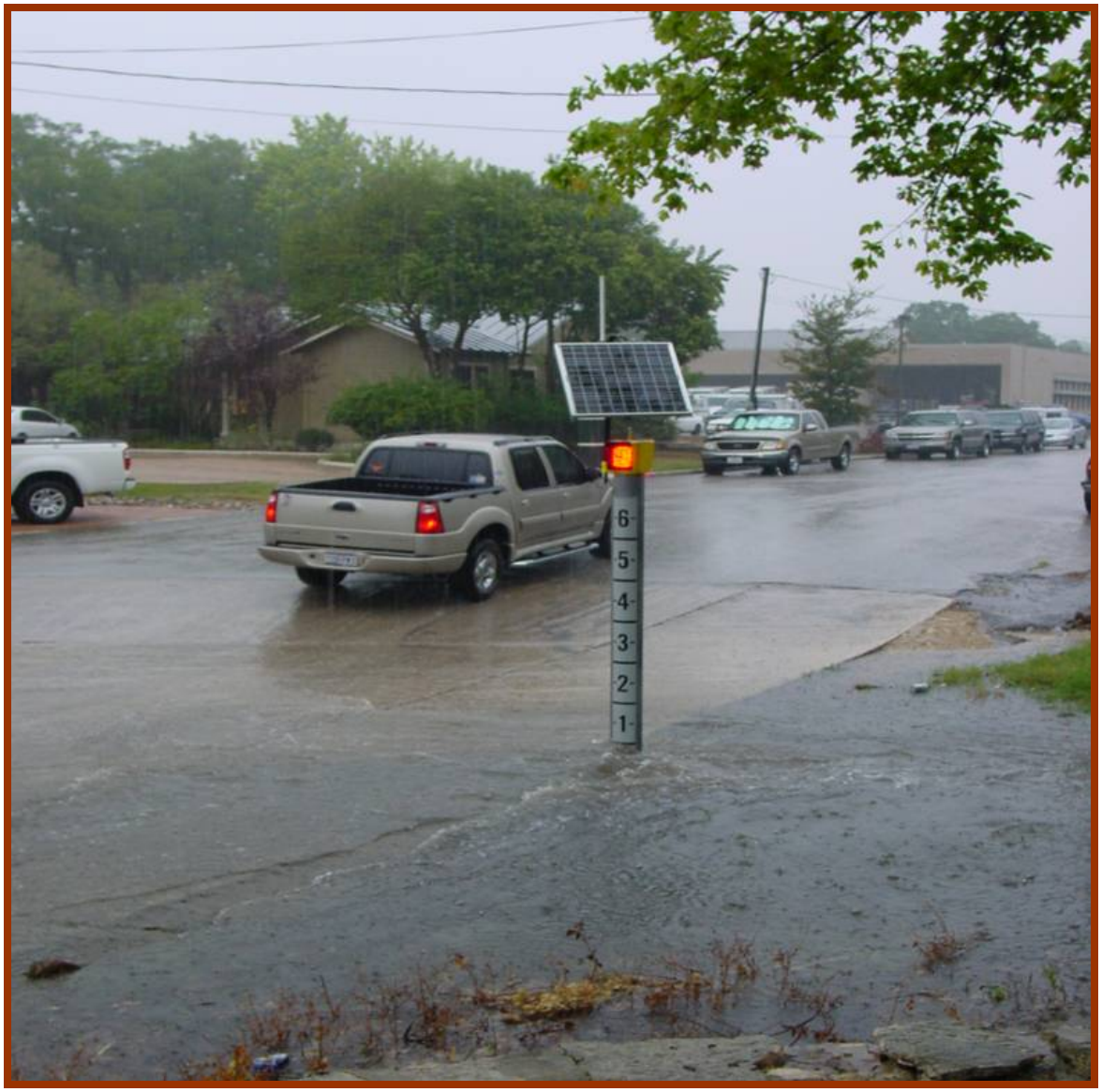


Figure 33: Flood Gauge - Boerne, Texas

These photos were provided by Kenneth P. James, CEO, Watermark Safety, 2200 Danbury, San Antonio, TX 78217.

The Matagorda County Emergency Management Plan describes warning procedures in depth in Annex A – Warning. The Matagorda County Emergency Management Coordinator maintains the Emergency Management Plan. Similar documents have been produced by the cities of Bay City and Palacios.

Flood Response

The TCRFC All-Hazards Mitigation Plan outlines specific response procedures for Matagorda County and the cities of Bay City and Palacios in the event of disaster. Disaster response activities are also addressed in the individual community Emergency Management Plans and

numerous functional annexes. Efforts to update the TCRFC All-Hazards Mitigation Plan were initiated in 2009 and the current and updated plans are available on line at www.tcrfc.org. The TCRFC Mitigation Plan will be reviewed annually and next schedule update will be in 2014.

Critical Facilities Protection

The Matagorda County Flood Mitigation Planning Committee has identified the critical facilities located within the planning area. A listing of the critical facilities may be found in Section 3.4 of this plan.

Matagorda County has established working relationships with engineering consultants that can provide assistance during disaster response operations and to initiate disaster recovery activities. Matagorda County will explore contractual arrangements with emergency response providers to supply emergency equipment such as generators, pumps, portable or package wastewater treatment plan equipment and other vehicles, equipment, and services that may be required for emergency operations and disaster recovery.

Emergency Management Expo – 2008

Representatives from Matagorda County attended the Emergency Management Expo – 2008 held at the Wharton Civic Center June 24, 2008. The one day Expo included the following presentations:

- Hurricane Awareness
- Flooding on the Colorado
- Evacuation
- Crisis Response
- Nuclear safety

5.5 STRUCTURAL PROJECTS (CRS ACTIVITY 511.7.E)

Flood Protection Projects

The U.S. Army Corps of Engineers, Fort Worth District has completed the Lower Colorado River Basin Phase I, Texas Flood Damage Reduction Project Feasibility Study.

On January 25, 2005, The City of Wharton submitted an application to the US Army Corps of Engineers, Galveston District to establish eligibility for the construction of improvements to Santa Fe Ditch to alleviate significant flood damages to the City. The estimated cost of this effort is $2,900,000. On January 25, 2006, the USACE approved the City of Wharton's request for credit eligibility under Section 104 of the WRDA of 1986. The City of Wharton has entered into an interlocal agreement with the LCRA to authorize the LCRA to be the "Local Sponsor" for the proposed Flood Damage Reduction Project. Funding for the design phase, $200,000, has been requested from Congress. Volume III – Wharton Interim Feasibility Report and Integrated Environmental Assessment includes the following recommended improvements:

The Recommended Plan for the Wharton project consists of structural features in the form of earthen levees and accompanying sumps, floodwalls, a channel enlargement, storm drain type drainage structures and an open cut ditch. Most of the project features would be implemented into three different drainage areas: Colorado River, Baughman Slough and Caney Creek. Both the Colorado River and Caney Creek flow downstream into Matagorda County. The Recommended Plan associated with the Colorado River would include the construction of 20,310 feet of levees, 19,010 feet of floodwalls and seven sump areas. The seven sumps would occupy 120 acres. Recommended features in Baughman Slough would include 6,610 feet of levees, 380 feet of floodwalls, 4,780 feet of channel modification and two sump areas. The two sumps would occupy approximately 43 acres. Recommended features in Caney Creek would include placement of reinforced concrete pipes and approximately 10,700 feet of open cut ditch.

Implementation of the Recommended Plan would result in impacts including approximately 65 acres of riparian/hardwood forests (148 average annual habitat units (AAHU) using 4 species), 129 acres of grassland (193 AAHU using 3 species) and 10 acres of wetlands (12 AAHU using 3 species). The recommended mitigation plan calls for all habitat mitigation to be placed on project sump lands. Approximately 145 acres could be used to create replacement forest, shrub and native prairie habitat. Approximately 40 acres could be used to create replacement wetland habitat. The recommended mitigation plan would generate approximately 256 AAHU of forest habitat and 66 AAHU of wetland habitat. This is well over the required mitigation ratio of 1:1 to fully compensate for project impacts. The mitigation may be revised in the detailed design phase and would be coordinated with resource agencies.

Diversions/Channel Modifications/Storm Sewers

The Cottonwood Creek Flood Protection Plan was completed in October 1990, funded by the TWDB, identifying 5 alternatives to divert Cottonwood Creek flood flows to the Colorado River. The project was completed in the early 1990's but a Letter of Map Revision (LOMR) was not submitted to FEMA to revise the bay City Flood Insurance Rate Map.

In 2009, the Matagorda County Conservation and Reclamation District, in cooperation with Wharton County Drainage District, initiated the Tres Palacios River Study to identify drainage issues and need improvements in both Wharton and Matagorda counties. This study is scheduled for completion in 2010 and will identify needed improvements.

Seawalls, Levees, Floodways and Revetments

The **Palacios Seawall** is a 1.1 mile long concrete seawall with a top elevation of 4.5 feet constructed along the Matagorda Bay shoreline. This structure was severely damaged by Hurricane Carla in September 1961 and approximately 2,200 feet of the structure was repaired. The Palacios Seawall has performed very well preventing erosion that has damaged other coastal areas in Matagorda County but the Seawall has not been mapped as providing protection from the 1% or 100-year flood.

The FEMA Levee Report dated February 19, 2008 identifies eight (8) levee systems in Matagorda County. All eight levee systems are shown as certified prior to development of FEMA's levee policy (44 CFR 65.10). These levee systems must be certified as meeting FEMA's levee certification criteria or be mapped as Special Flood Hazard Areas.

The following Levee Report summarizes the levee systems in Matagorda County:

Table 7: Matagorda County Levee Report Halff Associates, Inc.
Levee Name: Town of Matagorda

Levee Type	Flooding Source	Levee Length (miles)	Bank	FIRM Panel No.	FIRM Panel Date	Protected Flood Zone
Ring	Colorado River	6.1	Left	555D,	5/4/1992	C or Zone X (unshaded)
				565D	5/4/1992	C or Zone X (unshaded)
Riverine	Intracoastal Waterway	1.1	Right	560C	3/18/1985	B or Zone X (shaded)
Riverine Road Embankment	Caney Creek	4.3	Left	450D,	5/4/1992	B or Zone X (shaded)
				300C	3/18/1985	C or Zone X (unshaded)
Riverine	Colorado River	10.0	Right	225C,	3/18/1985	C or Zone X (unshaded)
				375C	3/18/1985	C or Zone X (unshaded)
Riverine	Colorado River	13.3	Left	230C,	3/18/1985	C or Zone X (unshaded)
				250C,	3/18/1985	C or Zone X (unshaded)
				375C	3/18/1985	C or Zone X (unshaded)
Riverine	Colorado River	8.5	Left	100C,	3/18/1985	C or Zone X (unshaded)
				115C,	3/18/1985	C or Zone X (unshaded)
				125C	3/18/1985	C or Zone X (unshaded)
Riverine	Cottonwood Creek	1.0	Left	115C	3/18/1985	C or Zone X (unshaded)
Riverine Road Embankment	Linnville Bayou	4.9	Right	150C	3/18/1985	C or Zone X (unshaded)

Total of 8 levees: 49.2 Miles, June 26, 2009
Data Source: FEMA Levee Report (Matagorda County, Texas) FEMA Region VI, February 19, 2008

Town of Matagorda Flood Protection Levee – The Town of Matagorda is surrounded by a 6.1 mile long ring levee identified on Matagorda County FIRM Panels 555D and 565D, dated May 4, 1992, and mapped as providing flood protection with areas behind the levee mapped as Zone C. This levee has not been certified as providing flood protection based on FEMA's 44 CFR 65.10 levee certification policy. The Matagorda County Consolidated Reclamation and Drainage District initiated an engineering study in 2009 for levee inspection and evaluation for the Town of Matagorda Levee. If the Town of Matagorda levee does not meet FEMA's levee certification requirements the area behind the levee may be mapped as a Special Flood Hazard Area (within the 1% or 100-year floodplain boundary)

Colorado River Flood Protection Levees near Bay City – The Colorado River levees near the City of Bay City are identified on Matagorda County FIRM Panels 100C, 115C, 125C, 225C, 230C, 250C, 375C, dated March 18, 1985 and mapped as providing flood protection with areas behind the levee mapped as Zone C. These levees have not been certified as providing flood protection based on FEMA's 44 CFR 65.10 levee certification policy. The Matagorda County

Consolidated Reclamation and Drainage District initiated an engineering study in 2009 to evaluate and inspect 42.05 miles of Colorado River levee through Bay City.

Caney Creek Riverine Road Embankment Levee – The 4.3 mile long Caney Creek road embankment levee identified on Matagorda County FIRM Panels 300C, dated March 18, 1985 and 450D dated May 4, 1992 and mapped as providing flood protection with areas behind the levee mapped as Zone B and Zone C. This levee has not been certified as providing flood protection based on FEMA's 44 CFR 65.10 levee certification policy

Cottonwood Creek Flood Protection Levee - The 1.0 mile long Cottonwood Creek levee identified on Matagorda County FIRM Panel 115C, dated March 18, 1985 is mapped as providing flood protection with areas behind the levee mapped as Zone C. This levee has not been certified as providing flood protection based on FEMA's 44 CFR 65.10 levee certification policy.

Linnville Bayou Road Embankment Levee - The 4.9 mile long Linneville Bayou road embankment levee identified on Matagorda County FIRM Panel 150C, dated March 18, 1985 is mapped as providing flood protection with areas behind the levee mapped as Zone C. This levee has not been certified as providing flood protection based on FEMA's 44 CFR 65.10 levee certification policy.

Figure 34: 8-Mile Sargent Beach Granite Revetment Wall

8-Mile Sargent Beach Granite Revetment Wall

Prior to 1991 the rates of erosion on Sargent Beach were so rapid that it was a matter of when, not if, the Gulf of Mexico would breach the Gulf Intracoastal Waterway thus shutting down this vital waterway to interstate barge traffic. With the billions of dollars in commerce generated from traffic in the GIWW, it could have been devastating to the entire country.

During 1991, President Bush set aside funds for a feasibility study to determine what action to take.

One option was to relocate the GIWW inland through the San Bernard Wildlife Refuge. The other was to build this “one of a kind” revetment wall on Sargent Beach.

In August 1993, Revetment Stability Tests for Sargent Beach, Texas were conducted by the US Army Corps of Engineers, Coastal Engineering Research center in Vicksburg, Mississippi. The objective of the study was to investigate, via a two-dimensional (2-D) coastal model, alternate designs for the proposed revetment. Tests were conducted at a geometrically undistorted scale of 1:24, model to prototype. Based on test results, it was concluded that: (1) Four- to six-ton armor stone is stable for the maximum wave heights that can be expected to occur for 8- and 10-sec waves at still-water levels (swl's) of +4.0 to +14.0 ft mean low tide (mlt) with assumed scour depths of -3.6 and -8.6 ft mlt. (2) Stability of the original concrete blocks, which were 6.0 ft by 5.5 ft by 2.5 ft and had 0 percent porosity, was only marginally acceptable for the maximum wave heights that can be expected to occur for 8- and 10-sec waves at swl's of +4.0 to +14.0 ft mlt with an assumed scour depth of -3.6 ft mlt. (3) Several modified block plans were tested and it was determined that the optimum block size was 5.75 ft by 5.75 ft by 2.5 ft. These blocks, weighing 6 tons and having a porosity of 4 percent, should prove stable for the maximum wave heights that can be expected to occur for 8- to 10-sec waves at swl's of +4.0 to +14.0 ft mlt with an assumed scour depth of -10 ft mlt.

The completed project is an 8-mile long, 30-ft. deep granite revetment wall constructed with a limestone base. These granite rocks weighed an average of 5 tons each. A total of 82,000 granite stones were used to construct the structure. A concrete sheet pile was driven along a section of the wall then capped in concrete to prevent any movement.

This project is credited with saving the Gulf Intracoastal Waterway and also protects Sargent Beach and homes from coastal erosion. Sargent Beach has the only residential beachfront property in Texas that is protected by such a seawall.

Not only does Sargent Beach have the protection of the revetment wall, a law was passed in September 2001 that allows homes on Sargent Beach to be built seaward of the vegetation line as long as the property is between the revetment wall and the GIWW. This law is very specific and applies only to Sargent Beach. It does not apply to any other part of the Texas Coast.

A recommended project to protect Sargent Beach is the dredging of the San Bernard River. The dredging project should improve river flow where the San Bernard empties into the Gulf Intracoastal Waterway. An estimated 235,000 cubic yards of sand from the dredging will be deposited southwest of the new channel in the surf zone. A study by The University of Texas concluded that placement of the dredged sand in the surf zone should result in sand replenishment on Sargent Beach by natural Gulf currents.

5.6 PUBLIC INFORMATION (CRS ACTIVITY 511.7.F)

Map Information

The local floodplain manager for Matagorda County and cities of Bay City and Palacios allow public access to view Flood Insurance Studies, FIRM maps and flood hazard information.

Citizens may contact the community permit department to schedule a time to view the maps with an employee or they may stop by the office to view the maps without employee assistance. Each community Building Department also provides the website address and phone number to obtain the FIRM map from the FEMA. Additionally, county and city officials supply the website address and FIRMETTE instructions for the public to obtain and print FEMA's electronic FIRM.

The TWDB, TFMA and TCRFC websites, listed below, also provide links to FEMA's Flood Map Store and other valuable floodplain and flood map information.

www.twdb.state.tx.us
www.tfma.org
www.tcrfc.org
www.fema.org

Outreach Projects

The Texas Colorado River Floodplain Coalition (TCRFC) has established a website www.tcrfc.org and sponsor public outreach workshops to inform the public regarding flood hazards, the NFIP, environmental awareness and Turn Around Don't Drown (TADD) campaigns.

Flood mitigation actions that address public outreach are listed in Plan Section 6.0. The TCRFC, in cooperation with HGAC, have key outreach roles identified in the proposed flood mitigation actions.

Real Estate Disclosure

Matagorda County and cities of Bay City and Palacios have working relationships with the local real estate industry in regards to floodplain management. An eligible CRS activity is an outreach informational memo to be mailed to realtors, lenders, and insurance agents detailing that deal with the public regarding properties located in the SFHA. It is a violation of State law for the seller not to notify a potential buyer that a home has flooded or is in the floodplain. The seller may request a detailed description of NFIP flood insurance claims by sending proof of home ownership to:

FEMA Headquarters
Attention: Freedom of Information Act
500 "C" Street SW
Washington, DC 20472

The seller may request flood claims information from FEMA www.fema.gov for specific property information.

Library

The local floodplain administrator for Matagorda County and cities of Bay City and Palacios each maintain a Flood Protection Reference Library. Reference materials and other literature related to floodplain management and participation in the NFIP are available for review. The Matagorda County Flood Insurance Study, Flood Insurance Rate Maps and other Corps of Engineers, LCRA, TCRFC and FEMA studies and publications are available for reference. The reference materials include topics such as flood insurance, retrofitting floodprone properties, flood protection, elevation of floodprone structures, protective barriers and emergency measures to minimize flood damages. Citizens are encouraged to review the literature on a periodic basis.

Technical Assistance

As a community service, the Permits Department of Matagorda County and cities of Bay City and Palacios provide technical assistance and references to technical resources to citizens, homeowners, developers, engineers and surveyors regarding NFIP and community building permit requirements. Services provided include: Flood Insurance Rate Map (FIRM) determinations; floodplain and floodway development requirements; floodproofing requirements; substantial damage and improvement requirements; coastal construction requirements; wetland permit requirements; Endangered Species Act (ESA) requirements and contact information for publications, Federal and State agency assistance and information regarding the NFIP.

Environmental Education

The Lower Colorado River Authority website www.lcra.org contains information related to environmental education and coordination with environmental sources: EPA and other Federal, State and nonprofit agencies such as TWDB, TCEQ, NRCS, USACE, TPWD, LCRA, TCRFC, HGAC, the Bayou Preservation Association, and Galveston Bay Foundation.

6.0 DRAFT ACTION PLAN (CRS ACTIVITY 511.8)

Matagorda County Flood Mitigation Actions

The Matagorda County Flood Mitigation Plan will be maintained by the Matagorda County Floodplain Administrator in cooperation with floodplain managers and emergency managers from the cities of Bay City and Palacios. The Matagorda County Floodplain Administrator is responsible for retaining copies of the plan, coordinating review of the plan, and future updates to the plan.

The Matagorda County Flood Mitigation Planning Committee evaluated the proposed TCRFC regional mitigation actions to identify mitigation actions that may be implemented by Matagorda County and the cities of Bay City and Palacios. The actions identified below were determined to be the most appropriate actions given the current resources and hazard vulnerabilities for Matagorda County and participating communities. Initiation of these actions is dependent upon

the availability of funding and resources of Matagorda County and the cities of Bay City and Palacios and the availability of the Federal, State and other funding sources identified.

A total of eighteen (18) Flood Mitigation Actions have been identified to address the Floodplain Management Planning Goals established by the Matagorda County Flood Mitigation Planning Committee. Separate Flood Mitigation Actions have been identified for Matagorda County and each participating community as follows:

Matagorda County	City of Bay City	City of Palacios
F1	F1	F1
F2	F2	F2
F3	F3	F3
F4	F4	F4
F5	F5	F5
F6		F6
F7	F7	F7
F8	F8	F8
F9	F9	F9
F10	F10	
F11	F11	F11
F12	F12	F12
F13	F13	F13
F14		
F15	F15	F15
F16	F16	F16
F17	F17	F17
F18	F18	

Flood Damage Reduction (F)

Addresses: Flooding
Goal: Make Matagorda County more flood resistant:

F.1 Reduce Flood Losses and Increase NFIP Flood Insurance Coverage throughout Matagorda County

Based on NFIP flood insurance policy and claims data, there are only 3,884 flood insurance policies in force, which is approximately 20% of the 18,611 structures in Matagorda County. Based on FEMA's NFIP policy data on www.fema.gov there is $717M in flood insurance coverage in Matagorda County and the cities of Bay city and Palacios. There have been 1,391 paid flood insurance claims for a total of $14.04M (Average claim = $10,096) in Matagorda County since 1978. FEMA has identified 108 Repetitive Loss Properties in Matagorda County. A Repetitive Loss Property is a property that has received two or more paid flood insurance claims that exceed $1,000.00 within a ten year period. FEMA designates communities with 10 or more Repetitive Loss Properties as a Category "C" community. By utilizing FEMA funding

administered by TDEM and TWDB, Matagorda County and participating communities can address problems in flood loss and repetitive loss areas by initiating acquisition and elevation projects for identified structures and by designing and constructing drainage improvements.

In the survey, conducted as part of the Flood Mitigation Plan preparation, 86% of the responders know that they live in a designated flood hazard zone. See Plan Section 1.3.2. The Texas Colorado River Floodplain Coalition (TCRFC) developed "TIMS" to assist and inform the public by utilizing the TIMS interactive map to determine if their home or place of business is located in a flood zone. TIMS has a search engine where the user can enter an address to locate the specific site. TIMS can be found on the following link: http://tims.lcra.org/Launch.aspx

This Mitigation Action Item recommends bi-annual Flood Insurance Workshops to be coordinated by the FEMA and/or the NFIP Region 6 Office utilizing "Flood Smart" publications. Matagorda County and the cities of Bay City and Palacios are members of the Houston-Galveston Area Council (HGAC) and the TCRFC, the likely sponsors of future workshops and outreach events. Community floodplain managers, insurance agents, developers, homeowners and the general public are target workshop attendees. The purpose of the workshop is to inform attendees that flood insurance is available for all structures located in communities that participate in the NFIP and that flood insurance policies protect against losses both for structures and contents.

Goal:	Educate the public with the goal to increase the flood insurance policy base to minimize the financial impact of future floods.
Responsibility:	Matagorda County Floodplain Administrator City of Bay City Floodplain Administrator City of Palacios Floodplain Administrator TCRFC (continue to post website information) HGAC FEMA Region VI Flood Smart NFIP Regional Office TWDB – State Floodplain Coordinator
Cost:	$641 = Average NFIP annual premium for insurance policies (estimate) $64,100 Annual premiums for 100 new NFIP policies FEMA, NFIP/Flood Smart and TWDB provide workshops at no cost
Funding Sources:	NFIP Policies (Flood Policy Fund) Owners of residential and nonresidential structures Renters and building occupants
Workshops:	TCRFC HGAC FEMA/DHS

NFIP (National Flood Insurance Program Region VI)
TWDB (Texas Water Development Board)

Timing: Flood Insurance workshops to be held in the 2010 – 2015 time period.

Beneficiary: All citizens and property owners in Matagorda County

F-2 Design, construct and maintain drainage improvement projects to minimize the risk of loss of life and future flood damages by utilizing funding from Federal, State, Capital Improvement Program (CIP), Development or Stormwater Utility Fee and other funding sources.

The National Weather Service reports that the national 30-year average for deaths related to flooding is 127 per year. Of that yearly average, nearly half are related to motorists attempting to cross roadways that are overtopped by floodwaters and recent (2007 and 2008) Texas flood deaths have exceeded the annual State average. The Matagorda County Consolidated Reclamation and Drainage District Study, currently underway, will identify problem areas including roadway crossings that are overtopped by floodwaters in the Tres Palacios River watershed. These problem areas present public danger and potential loss of human life. Detail information for each creek and watershed improvement will be described in the Matagorda County Consolidated Reclamation and Drainage District Study.

The Matagorda County Commissioners Court mandated that future drainage improvement and flood protection projects must be regional or watershed based, and designed and constructed so that areas downstream of the proposed projects will not be negatively impacted. Therefore future storm water diversion, detention and reservoir projects must be designed to protect both upstream and downstream areas.

This proposed action includes the implementation of the Matagorda County Consolidated Reclamation and Drainage District Study recommendations to construct needed improvements to reduce the risk of loss of life and property damage. Annual revisions of the Matagorda County Flood Mitigation Plan will identify future drainage improvement projects and estimated costs.

Responsibility: Matagorda County
City of Bay City
City of Palacios

Cost: To be determined by the Matagorda County Consolidated Reclamation and Drainage District Study

Funding Sources: FEMA/TDEM - Hazard Mitigation Grant Program
FEMA/TWDB – Flood Mitigation Assistance funds
TWDB - Flood Protection Planning Grants and Loans
NRCS – Stream Restoration Project funding
Storm Water Utility Fee and/or Bond Program (Under consideration)

Matagorda County and participating communities Capital Improvements Program (CIP)

Timing: Design and construction to be phased as funding becomes available.

Beneficiary: All citizens and property owners in Matagorda County

F-3 Acquisition and Relocation, Elevation and "Demo-Rebuild" of Floodprone Structures

This proposed action will assist local community efforts to identify potential structures and initiate acquisition and relocation, elevation and demo-rebuild projects to reduce the risk of future flood losses. The Matagorda County Repetitive Loss Plan includes a database listing of 200 Repetitive Loss Properties, properties that have had multiple flood insurance claims, and properties located in areas of high flood risk. In addition to 200 Repetitive Loss Properties in Matagorda County there are approximately 800 properties that have had a single flood insurance claim and any future claims would reclassify them as Repetitive Loss. This information is confidential in nature and used by the Flood Mitigation Planning Committee and participating communities for planning purposes only.

This proposed action identifies funding opportunities for future HMGP, FMA, SRL, Repetitive Flood Claims (RFC), USACE Federal Flood Protection Projects, TWDB Flood Protection Planning Grants, NRCS Floodplain Easement and Elevation Projects, and county and community funded buyout and elevation projects. It is recommended that Matagorda County, TCRFC and HGAC sponsor Buyout Conferences to inform and assist local communities and the general public regarding options, methods and funding sources to reduce flood losses.

Several successful mitigation projects were completed in Matagorda County following Tropical Storm Claudette when coastal structures were substantially damaged and rebuilt above the base flood elevation (BFE) referenced on the Flood Insurance Rate Map (FIRM). All structures substantially damaged by Hurricane Ike (September 2008) are required to be reconstructed in compliance (elevated) with BFEs defined in the current FIRMs.

FEMA's Flood Mitigation Assistance (FMA) Program provides funding to communities for acquisition and relocation and elevation but does not currently fund "demo-rebuild" projects. "Demo-Rebuild" projects, funded by Texas Department of Housing and Community Affairs (HCA) have been completed in nearby Wharton and El Campo. Substandard properties, located in blighted areas with low income owners, are eligible and should be targeted for HCA funding. Selected properties may be floodprone, repetitive loss, or severe repetitive loss. These properties, when rebuilt, must be elevated above the base flood elevation.

To support this Mitigation Action, the Flood Mitigation Planning Committee recommends expanding the Matagorda County Repetitive Loss Plan to include additional property information. Recommended actions include surveying the lowest floor elevation, preparing FEMA Elevation Certificates and documenting Matagorda County Appraisal District values for all Repetitive Loss properties and selected floodprone properties targeted for future acquisition,

relocation, elevation, demo-rebuild, and flood protection projects that may be eligible for funded with HMGP, FMA, HCA and TDRA funding. The Matagorda County Repetitive Loss database, prepared as part of the Matagorda County Flood Mitigation Plan, lists repetitive loss properties identified by FEMA. This Mitigation Action recommends expanding the Repetitive Loss Plan and database to include:

- Properties located in the FEMA Floodway
- Properties with known flood hazards
- Appraisal District values (structure and land)
- Elevation Certificates and structure data (Lowest floor, type structure, etc)
- Property owner contact information (confidential)
- Base Flood Elevation data
- GIS mapping

FEMA requires submittal of a detailed benefit:cost (b:c) analysis to justify expenditure of federal funds (HMGP, FMA, SRL and RFC) for these projects. This information needs to be readily available in the database but safeguarded to protect property owner's privacy.

FEMA Region VI provided NFIP flood loss records, for planning purposes only, identifying a total of 155 properties in Matagorda County have receive 2 or more paid flood insurance claims that exceed $1,000 for each claim. FEMA has designated 5 of the 155 as Severe Repetitive Loss Properties:

	RL Properties	% of Total
Matagorda County	155 Repetitive Loss Properties	77.5%
City of Bay City	41 Properties	20.5%
City of Palacios	4 Properties	2.0%
Matagorda County Total	200 Properties	

The estimated cost to acquire approximately 200 Matagorda County repetitive loss properties and to relocate the owners/tenants is $ 35.5M for acquisition and relocation cost, and $ 6.0M demolition cost that includes an estimated $30,000 for demolition cost for each structure. (Note: the average flood insurance policy in Matagorda County is $184,718 and each policy includes a maximum of $30,000 Increased Cost of Construction (ICC) available for elevation or demolition of NFIP insured structures located in the Special Flood Hazard Area.)

The estimated cost to perform a "demo-rebuild" project is considered to be comparable to acquisition and relocation options. Specialized conditions such as soil type, proximity to the floodway and coastal erosion rates may encourage the County or community to select one option over another or the decision may entirely become b:c ratio influenced. However the ultimate mitigation action decision lies with the community and the homeowner.

Responsibility: Matagorda County Floodplain Administrator
City of Bay City Floodplain Administrator
City of Palacios Floodplain Administrator
Individual property owners (voluntary):

FEMA/DHS
Texas Division of Emergency Management (TDEM)
Texas Water Development Board (TWDB)

Cost: $20,000 estimated cost to update the RL Database with GIS data
$ 35.5M estimate acquisition and relocation cost (200 parcels)
[$ 26.6M = 75% Federal Share]
[$ 8.9M = 25% Local Share]
$6.0M estimated demolition cost for 200 parcels (may be eligible for ICC funding)

Cost breakdown per Community:

Matagorda County – (Total)	$ 27.5 M Acquisition + $ 4.65M Demolition (155 properties)
(25% Local Share)	$ 6.87M Acquisition + $ 1.16M Demolition
City of Bay City- (Total)	$ 7.3M Acquisition + $ 1.23M Demolition (41 properties)
(25% Local Share)	$ 1.82M Acquisition + $ 307,500 Demolition
City of Palacios – (Total)	$ 710,000 Acquisition + $ 120,000 Demolition (4 properties)
(25% Local Share)	$ 177,500 Acquisition + $ 30,000 Demolition

Funding Sources: FEMA/TDEM - Hazard Mitigation Grant Program (HMGP)
FEMA/TDEM – Pre Disaster Mitigation (PDM) Program
FEMA/TWDB – Flood Mitigation Assistance (FMA) Program
FEMA/TDEM – Repetitive Flood Claims (RFC) Program
FEMA/TWDB – Severe Repetitive Loss Program
NRCS – Floodplain Easement Program
NRCS – Structure Elevation Program
Increased Cost of Construction (ICC) NFIP Policy Fund
Funding available from a future Presidential declared disaster
Texas Department of Rural Affairs (TDRA) – (Texas)
Texas Department of Housing and Community Affairs
Other Federal and State Agencies programs
Individual property owners
Matagorda County
City of Bay City
City of Palacios

Timing: Repetitive Loss Buyout plan to be developed in 2010 and 2011 and carried out as funding becomes available or a disaster occurs.

Beneficiary: Property Owners in Matagorda County

F-4 Floodplain Mapping for unmapped streams in Matagorda County

In 2006, FEMA initiated a $1.3M remapping effort for Matagorda County. The major cost elements include new LIDAR mapping and updated coastal storm surge modeling. Unfortunately only a small portion of the remapping effort was allocated to updating hydrology and hydraulics. As part of the remapping effort, the Texas Natural Resources Information System (TNRIS) flew new LIDAR mapping of counties along the Texas Gulf Coast and provided the mapping products to the USACE and FEMA. Following Hurricane Rita (2005), the US Army Corps of Engineers and FEMA initiated the USACE/FEMA Joint Texas Coastal Hurricane Surge Project to produce new hurricane storm surge and wave run-up elevations along the Texas Gulf Coast. This joint remapping effort will produce new flood insurance rate maps for coastal counties in Texas including Matagorda County. This massive study effort was delayed in 2008 to incorporate technical data from Hurricane Ike and new FIRMs are scheduled to be published in 2010.

The effective flood insurance studies for Matagorda County, Bay City and Palacios were published from 1985 to 1992 and are considered to be out-of-date and inadequate for floodplain management purposes. The Matagorda County Consolidated Reclamation and Drainage District initiated studies in 2009 to remap floodprone areas not scheduled for remapping by FEMA. The Matagorda County Consolidated Reclamation and Drainage District study includes two major tasks: (1) new hydrology and hydraulics studies of the Tres Palacios River in Matagorda County and (2) conversion of 39.28 river miles of the US Army Corps of Engineers Lower Colorado River Flood Damage Reduction Study to FEMA mapping criteria. This important data, funded entirely by the Matagorda County Consolidated Reclamation and Drainage District, will be incorporated into FEMA's Matagorda County remapping effort.

FEMA's remapping budget was minimal therefore many streams in Matagorda County will not be studied and mapped as approximate Zone A's without base flood elevations and floodways identified. The Matagorda County Flood Mitigation Plan Committee recommends that detail floodplain mapping be developed for <u>all</u> streams in Matagorda County and participating communities to establish and enforce sound floodplain management programs.

This flood mitigation action is to conduct detail hydrologic and hydraulic studies and map the 1% (100-year), 0.2% (500-year) floodplain and floodway boundaries and establish BFEs for <u>all</u> streams in Matagorda County. To accomplish this task, Matagorda County and participating communities will need technical and financial assistance from the TCRFC, LCRA, TWDB and FEMA. The goal of this mitigation action is to update the Matagorda County Flood Insurance Study and FIRMs to include detail floodplain information for all streams in Matagorda County.

In 2009, FEMA initiated Risk MAP as a Phase II Map Mod Initiative to address mapping needs not addressed during Map Mod (2003 to 2009). Matagorda County and the cities of Bay City and Palacios, working with LCRA and TWDB/TNRIS, can capitalize on future Federal and state funding to map the remaining streams in Matagorda County and update the Matagorda County

FIRM. Both LCRA and TWDB/TNRIS are FEMA Cooperative Technical Partners (CTP) and either would be ideal to lead this mapping update effort.

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Phase 1	USACE/FEMA Joint Texas Coastal Hurricane Surge Study
Phase 2	Matagorda County Consolidated Reclamation and Drainage District Study
Phase 3	Inspection and certification of flood protection levees in Matagorda County
Phase 4	FEMA's Matagorda County remapping effort
Phase 5	Study and mapping of unstudied streams in Matagorda County

Responsibility:	Matagorda County City of Bay City City of Palacios LCRA as a FEMA CTP TNRIS as a FEMA CTP Matagorda County Consolidated Reclamation and Drainage District
Cost:	Phase 1 – funded 2005-2010 [FEMA and USACE] Phase 2 – funded 2009-2010 [MCCRD] Phase 3 – funded 2009-2010 [MCCRD] Phase 4 – funded 2006-2010 [FEMA] Phase 5 - $5.0M (estimated)
Funding Sources: (Phase 5 only)	FEMA Risk MAP funding (2010-2014) Federal funding following a future Presidential declared disaster when funding is available for flood recovery mapping TWDB/CTP (floodplain studies and mapping) LCRA/CTP
Timing:	2010-2014 Mapping will be phased as funding becomes available.
Beneficiary:	All citizens and property owners in Matagorda County

F-5 Adopt "Higher Standard" Riverine Flood Damage Prevention Ordinances and Standards

The Matagorda County Flood Mitigation Planning Committee reviewed the current ordinances for Matagorda County and the cities of Bay City and Palacios and compared each to several "Higher Standard" Flood Damage Prevention Ordinances that have been adopted by other Texas communities and the model ordinance prepared by FEMA Region VI. Matagorda County, Bay city and Palacios have all adopted a "higher standard" ordinance requiring new construction to be elevated a minimum of one foot above the base flood elevation (BFE) shown on the current Flood Insurance Rate Map (FIRM). The TCRFC also developed a "Higher Standard" Ordinance for consideration by TCRFC communities. A "Higher Standard" Flood Damage Prevention Ordinance can assist a community's efforts to reduce future flood losses and provide additional Community Rating System (CRS) credits for communities desiring to participate in FEMA's CRS Program. In 2010 Matagorda County and the cities of Bay City and Palacios will be

required to adopt the new Matagorda County (county-wide) Digital Flood Insurance Rate Maps (DFIRMs) by a new flood damage prevention ordinance. Should a community choose to adopt a "higher standard" flood damage prevention ordinance, that community will receive a higher CRS rating should they elect to enroll in the CRS Program. One "higher standard" recommended by the Committee is to require future critical facilities to be constructed outside the 500-year (0.2% annual chance) flood boundary or to be elevated or floodproofed above the 500-year (0.2% annual chance) flood elevation. Matagorda County and the cities of Bay City and Palacios will continue to participate in TCRFC and HGAC Floodplain Management activities where NFIP requirements and "higher standards" are discussed with representatives from FEMA, TWDB and other TCRFC and HGAC communities. The TCRFC "higher standard" model ordinance contains options where a community can select key floodplain management requirements similar to the following listing developed by FEMA Region VI:

- 1', 2' or 3' freeboard (Matagorda County, Bay City and Palacios are currently considering adopting +2' or +3' as the minimum elevation requirement for new construction)
- Base Flood Elevations (BFEs) defined by fully developed watershed conditions
- Floodways defined by fully developed watershed conditions
- Floodways defined by zero rise
- On–site detention to compensate for the effects of proposed development
- Regional detention facilities funded by site development fees
- Minimum setbacks from floodways and stream banks
- Protection of critical facilities
  -Meet 500-year floodplain standards
- Protection of floodplain storage capacity
  -Prohibit fill in the 100-year floodplain
- Cumulative substantial improvement/substantial damage
  -Combination of multiple improvements/damage in reaching less than 50% threshold
- Regulate development in the Zone B or *shaded* X and Zone C or *unshaded* X
  City of Friendswood is a model requiring lowest floors to be elevated in Zone X
- Regulations for natural and beneficial functions
  -Restrictions on development in sensitive areas, i.e.: wetlands, riparian areas, shorelines, stream channels, banks, and habitats
- Low Density Zoning
  -Limit development i.e.: no more than one building constructed per acre of floodplain

Responsibility:	Matagorda County (Adopt Higher Standard Ordinance) City of Bay City (Adopt Higher Standard Ordinance) City of Palacios (Adopt Higher Standard Ordinance) All - Evaluate and possibly enroll in FEMA's CRS Program TCRFC and TFMA – Technical assistance HGAC and TCRFC (Floodplain Management Workshops)
Cost: (Higher Standards)	\$500 to \$2,000 per residential structure (estimated cost) \$1,000 to \$10,000 nonresidential structure (estimated cost)

Administrative Cost: Staff Time under current budgets

Funding Sources: Not Required

Timing: 2010 to 2015

Beneficiary: Citizens and property owners in Matagorda County

F-6 Adopt "Higher Standard" Coastal Flood Damage Prevention Ordinances and Standards (Coastal High Hazard Areas - Zone VE and Coastal A Zones)

The Matagorda County Flood Mitigation Planning Committee reviewed the current ordinances for Matagorda County and the city of Palacios and compared them to several "Higher Standard" Flood Damage Prevention Ordinances that have been adopted by other Texas coastal communities and the model "higher standard" ordinance prepared by TCRFC. A "higher standard" Flood Damage Prevention Ordinance can assist a community's efforts to reduce future flood losses and provide additional Community Rating System (CRS) credits for communities desiring to participate in FEMA's CRS Program. In 2010 Matagorda County and the cities of Bay City and Palacios will be required to adopt the new Matagorda County (county-wide) Digital Flood Insurance Rate Maps (DFIRMs) by a new flood damage prevention ordinance. Should a community choose to adopt a "higher standard" flood damage prevention ordinance, that community will receive a higher CRS rating should they elect to enroll in the CRS Program. Several coastal "higher standards" were evaluated by the Committee including compensation for sea level rise and coastal erosion:

- New construction, in coastal areas subject to a high erosion rate, would be required to be set back from the waters edge to compensate for future erosion based on a retreat rate reported by the Texas General Land Office.
- New construction in Coastal High Hazard Areas (Zone VE) would be required to be elevated a minimum of two feet above the base flood elevation, based on existing conditions, to compensate for projected sea level rise over a 50-year period.
- Require new construction in designated Coastal A Zones to comply with Zone VE construction requirements.
- Construction in Coastal Barrier Resource Act (CBRA) Zones will be discouraged and prohibited if allowable by law.

Matagorda County and the city of Palacios will continue to participate in TCRFC, TFMA and HGAC Floodplain Management activities where NFIP coastal requirements and "higher standards" are discussed with representatives from FEMA, TWDB and other coastal communities. The TCRFC "higher standard" model ordinance contains options where a coastal community can select key floodplain management requirements such as:

- 1', 2' or 3' freeboard in Zone VE
- Require Zone VE construction standards in Coastal A Zones
- Adoption of Coastal A Zone requirements based on a 1.5' breaking wave

- Establish minimum setbacks from water edge in areas with high erosion (retreat) rates
- Protection of critical facilities
  -New construction must be elevated or flood-proofed to 500-year elevation
- Cumulative substantial improvement/substantial damage
  -Combination of multiple improvements/damage in reaching less than 50% threshold
- Regulations for natural and beneficial functions
  -Restricting or prohibiting development in sensitive areas, i.e.: CBRA Zones, wetlands, riparian areas, coastal shorelines and wildlife habitats
- Restricting enclosures below BFE in Zone VE (100 sf, 200 sf or 300 sf)

Responsibility:	Matagorda County (Adopt Higher Standard Coastal Ordinance) City of Palacios (Adopt Higher Standard Coastal Ordinance) TCRFC (provide technical assistance) HGAC and TCRFC (Floodplain Management Workshops) FEMA, TWDB, TFMA (provide technical assistance)
Cost: (Higher Standards)	\$500 to \$2,000 per residential structure (estimated cost) \$1,000 to \$10,000 nonresidential structure (estimated cost)
Administrative Cost:	Staff Time under current budgets
Funding Sources:	Not Required
Timing:	2010 to 2015
Beneficiary:	Citizens and property owners in Matagorda County coastal areas

F-7 Provide Training for Community Floodplain Managers, Community Emergency Managers, CEM's and CFM's.

TWDB, TDEM, TCRFC, TFMA and HGAC currently host numerous floodplain and emergency manager training opportunities including: FEMA's FPM Training Course, E-273 "Managing Floodplain Development through the NFIP"; TWDB Floodplain Management 101; NFIP Workshops and Flood Forums; Community Rating System (CRS) Workshops; Hurricane Preparedness and exercises; Emergency Management and Home Land Security workshops; tabletop emergency exercises and numerous other training opportunities. These conferences and workshops enhance public awareness, assist local communities and provide training and continuing education credits (CEC's) for local floodplain administrators, certified floodplain managers (CFM's), certified emergency managers (CEM's), professional engineers (PE's), registered public land surveyors (RPLS) and the general public.

The proposed Flood Mitigation Plan Action Item is to initiate a coordination effort to provide workshops and training activities that can benefit Matagorda County and:

Agencies	Associations and Others
FEMA Region VI	TFMA
NFIP Regional Office	EMAT
TWDB/TNRIS	ASFPM
TDEM	IBC
LCRA	Texas Tech Wind Engineering
GLO	TCRFC
NRCS	ASCE
HGAC	SAME
NWS/NOAA	Texas A&M

Note: Agency and association acronyms are listed in Plan Attachment "A".

Proposed Workshops and Training Activities:

FEMA Flood Forums
TCRFC Quarterly Meetings and Workshops
HAZMAP Plan adoption and Plan maintenance (TDEM)
Managing Floodplain Development through the NFIP (FEMA)
Flood Mitigation Assistance (FMA) Plans (TWDB)
Flood Protection Planning Grants (TWDB)
Floodplain Manager Workshops (TWDB)
NFIP Workshops for community officials, lenders, agents, developers
Coastal Construction Workshops (FEMA, TWDB, ASCE)
Community Rating System (CRS) Workshops (FEMA/ISO)
TFMA Conferences and Mutual Aid activities
HAZUS Workshops (FEMA)
Substantial Damage Estimator Program (RSDE) FEMA/TWDB
Building Code Workshops (HGAC/IBC)
Tornado Safe Room Design and Coastal Construction Workshops (Texas Tech/FEMA)

Potential Funding Sources for Workshops and Training:

TWDB – Flood Protection Planning and FMA Program funding
TDEM – Disaster Exercises and HMGP Program funding
Skyward/Storm Ready (NWS)
Hazardous Weather Partner Workshops (NWS)
HYDROMET System (LCRA)

Responsibility: Matagorda County (Lead community to host training)
TCRFC
HGAC

Cost: Staff Time under current budgets

Funding Sources: Not Required

Timing: Annually 2010 to 2015

Beneficiary: Matagorda County and all participating communities

F-8 Identify Funding Opportunities for Drainage System Improvements

The Matagorda County Consolidated Reclamation and Drainage District Study will identify needed drainage improvements in the Tres Palacios River watershed in Matagorda County. FEMA's Matagorda County remapping effort will identify new riverine and coastal floodprone areas where flood protection and drainage improvements are needed. The Flood Mitigation Planning Committee identified the following funding possibilities:

- TWDB Flood Protection Planning Grants and Project Loans
- Flood Mitigation Assistance (FMA) Project grants to design and construct flood protection projects to protect flood prone properties
- Hazard Mitigation Grant Program (HMGP) funding to design and construct flood protection projects to protect flood prone properties
- Public Assistance (PA) funding following a major disaster to design and construct repairs and improvements to damaged flood protection and drainage facilities
- Federal Flood Protection Projects (USACE)
- Corps of Engineers 1140-1-211 "Support for Others" reimbursement of planning, design and construction (USACE)
- Steam Restoration Projects (USACE and NRCS)
- Floodplain Easement Program (NRCS)
- FEMA funding programs: Hazard Mitigation Grant Program (HMGP), SRL and Repetitive Flood Claims (RFC) – Acquisition and Relocation, Elevation and Demo-Rebuild of flood prone properties
- Texas Department of Rural Affairs (TDRA)
- Development fees for new construction to offset cost of regional drainage improvements
- County-wide storm drainage utility or impact fee
- Watershed Development Fees to offset watershed projects such as regional detention and channel improvements
- Creation of a county-wide drainage district
- Developer constructed improvements resulting in tax benefits and pay backs

This mitigation action is to identify and actively pursue funding mechanisms for future drainage improvements. Matagorda County and participating communities working together can plan, coordinate and fund the design, construction, and maintenance of (county-wide) drainage improvements and flood control projects that benefit entire watersheds and drainage basins.

Responsibility: Matagorda County
City of Bay City
City of Palacios

Cost:	To be determined by the Matagorda County Consolidated Reclamation and Drainage District Study 1. Identify funding sources 2. Submit applications for funding 3. Project planning 4. Design and construction – based on approved projects 5. Maintenance (annual expense)
Administrative Cost:	Staff Time under current budgets
Funding Sources:	TWDB USACE FEMA HMGP/PDM/SRL/RFC FMA NRCS Local Share - Funded by development fees, bonds and tax revenues
Timing:	2010 Tres Palacios River Study completion 2010 Levee certification needs identified 2010 FEMA's remapping of Matagorda County completion 2010 to 2015 Obtain funding and initiate design and construction

F-9 Establish County-Wide Bench Mark Network

The new Matagorda County FIRMs, scheduled to be published in 2010, will identify Elevation Reference Marks (ERM) or Bench Marks (BM) and Base Flood Elevations (BFEs) that are referenced to NAVD 1988 Elevation Datum. The Elevation Reference Marks and Base Flood Elevations (BFEs) on previously published FIRMs for Matagorda County and the cities of Bay City and Palacios identify Elevation Reference Marks and Base Flood Elevations referenced to NGVD 1929, which is no longer acceptable for National Flood Insurance Program (NFIP) purposes. Only 177 usable ERMs and BMs are identified in the National Geodetic Survey (NGS) database and available for floodplain management purposes (1,114 square miles or 1 BM per 6.3 square miles) presenting a major problem for local community administrators that must reference NAVD 1988 for new development permits. To assist local floodplain administrators, LCRA's High Accuracy Reference Network (HARN) System, accessible on line at www.harn.lcra.org, identifies 30 additional BMs that are referenced to NAVD 1988. The LCRA maintained HARN Network is mapped and described on the LCRA website. In 2006, LCRA installed a GPS base station in Bay City on the roof of the Matagorda Public Health Building to assist surveyors in the Lower Colorado River Basin that includes Matagorda County. The GPS base station was hit by lightning in late 2009 and had not been repaired and restored to operational status at the time of publication of this Plan. In 2009, Matagorda County Consolidated Reclamation and Drainage District funded installation of five (5) survey monuments (NAVD 88) as part of the Matagorda County Flood Mitigation Plan. Individual datasheets for these seven monuments are included in Appendix "B". The Matagorda County Flood Mitigation Planning Committee recommends establishing a county-wide network of NAVD 1988 bench marks that can be shared by

Matagorda County and the cities of Bay City and Palacios, along with USACE, TxDOT, LCRA, FEMA and others. This network must be readily available to surveyors, engineers, homeowners, insurance agents and general public for NFIP, floodplain management and general construction purposes. Participation by TxDOT, LCRA, NRCS, local surveyors and engineers is needed for this to be a successful mitigation action. Matagorda County's subdivision ordinance requires developers to establish a permanent survey monument in each new subdivision referenced to NAVD 1988 as part of all new subdivision developments.

Phase 1	LCRA established GPS base station in Bay City (2006)
Phase 2	LCRA established additional NAVD 1988 Bench Marks within Matagorda County as part of the LCRA HARN Network (2007)
Phase 3	Matagorda County installed five (5) additional NAVD 1988 Bench Marks (2009)
Phase 4	Matagorda County establishes a detailed database of NAVD 1988 bench marks
Phase 5	Identify areas where additional NAVD 1988 bench marks are needed.
Phase 6	Install (establish) new NAVD 1988 bench marks (2^{nd} Order)
Phase 7	TxDOT installs a GPS base station in Matagorda County (Base Sta #2)
Phase 8	LCRA installs a GPS base station in Matagorda County (Base Sta #3)
Phase 9	Annual review and update of the bench mark system including replacing missing or disturbed bench marks

Responsibility:
Matagorda County (develop and maintain bench mark system)
City of Bay City (technical support)
City of Palacios (technical support)
LCRA – maintain HARN network and GPS base stations
TxDOT – provide NAVD 1988 data on TxDOT BM's

Cost:
Phase 1 – Project completed October 2006 by LCRA
Phase 2 – Project completed in April 2007 by LCRA
Phase 3 – Project completed June 2009 by Matagorda County Consolidated Reclamation and Drainage District
Phase 4- $5,000 (estimated cost to prepare BM Database)
Phase 5- $5,000 (estimated study and mapping cost)
Phase 6- $20,000 (estimated cost for 20 new Bench marks)
Phase 7- $20,000 (estimated cost to install GPS base station)
Phase 8- $20,000 (estimated cost to install GPS base station)
Phase 9- $10,000 (estimated annual maintenance cost)

Administrative Cost: Staff time under current budgets

Funding Sources:
Federal funding following a future Presidential declared disaster
HMGP/PDM
FMA
TxDOT
TWDB/TNRIS

USACE
NRCS
LCRA/TCRFC
Local Share - Funded by bonds and tax revenues

Timing: Phase 1 – October 2006
Phase 2 – June 2009
Phase 3 – April 2007
Phase 4 – Planned in 2010
Phases 5, 6, 7 & 8 – Planned in 2010 - 2011
Phase 9 - 2010 – 2015 annual maintenance needed

F-10 Support Future Colorado River Flood Reduction Projects

LCRA and TCRFC, working closely with the USACE, continue to identify flood reduction projects on the Lower Colorado River that will reduce future flood losses in Matagorda County. The Matagorda County Flood Mitigation Planning Committee recommends supporting these actions and projects as a long range mitigation action by Matagorda County and the city of Bay City. By supporting these proposed projects and the efforts of LCRA, USACE and Wharton County, both politically and financially, Matagorda County can help save lives and reduce property damages from future flood events.

Responsibility: Colorado River
Matagorda County
City of Bay City
Wharton County
LCRA
TCRFC
USACE
NRCS
TWDB

Cost: Federal and local share to be determined by each project

Administrative Cost: Staff time under current budgets

Funding Sources: Federal funding following a future Presidential declared disaster
USACE
FEMA
HMGP
FMA
TWDB
NRCS (stream restoration)
Matagorda County (local share if required)
City of Bay City (local share if required)

Timing: 2010 to 2015 support projects as identified

F-11 Participation in FEMA's Community Rating System (CRS) Program.

Currently no Matagorda County communities participate in FEMA's CRS Program. FEMA recognizes community efforts that exceed the minimum requirements of the National Flood Insurance Program (NFIP) by designating communities that have adopted "higher standards" as CRS Communities. Flood insurance policies within communities that participate in FEMA's CRS program are rewarded with reduced flood insurance premiums. Currently there are only 45 Texas counties and communities that are enrolled in the CRS Program.

The TCRFC has established a CRS Coordinators role to assist Coalition communities with CRS activities such as:

Outreach (letters to owners of repetitive loss properties)
TCRFC website as a CRS Program resource
Newspaper articles within the basin to support floodplain management outreach activities
Floodplain management workshops sponsored by TCRFC
CRS Program technical resource for coalition communities

This Mitigation Plan Action Item is for the Matagorda County and the cities of Bay City and Palacios to evaluate the benefits of FEMA's CRS program and if warranted submit a CRS Program Application, document CRS activities, prepare annual reports, host CRS workshops and training activities, and develop programs that will result in future CRS credits. The Flood Mitigation Committee recognizes that the CRS Program may not be economically feasible for a community with a small number of flood insurance policies in force. Therefore, not all Matagorda County communities are likely candidates to enroll in the CRS Program. Based on NFIP records, the annual premiums for Matagorda County and participating communities are as follows:

Matagorda County:	2133 policies with $1,706,024 annual premiums
City of Bay City:	1178 policies with $476,308 annual premiums
City of Palacios:	478 policies with $249,825 annual premiums

Source: www.fema.gov policy statistics as of 08/31/08

The estimated flood insurance policy savings for a CRS Class 9 rating is estimated to be:

Matagorda County:	$85,301 annual savings ($426,000 over 5-years)
City of Bay City:	$23,815 annual savings ($119,000 over 5-years)
City of Palacios:	$12,491 annual savings ($62,500 over 5-years)

Source: www.fema.gov policy statistics as of 08/31/08
Note: CRS ratings are for a 5-year period and reviewed annually

Responsibility: Matagorda County Floodplain Administrator
City of Bay City Floodplain Administrator
City of Palacios Floodplain Administrator

TCRFC CRS Coordinator (Technical Support)

Cost: Staff time under current budgets

Funding Sources: Not required

Timing: 2009 – County and participating communities evaluate CRS Program
2010 – County or participating community submits CRS Application
2010 – FEMA conducts a Community Assistance Visit (CAV)
2010 – ISO conducts community verification visit
2011 – County and/or participating community enters the CRS Program
2012 - CRS program 1st evaluation (annual)
2016 – ISO 5-year verification visit

Beneficiary: NFIP policy holders in each CRS community

F-12 Create a Matagorda County Disaster Response Team

As part of the TCRFC All-Hazards Mitigation Plan, Matagorda County and the cities of Bay City and Palacios identified possible hurricane and tornado paths, floodprone properties, repetitive loss properties, HAZMAT corridors, and areas where emergency assistance may be needed. The Matagorda County Flood Mitigation Planning Committee recommended establishing a Matagorda County Disaster Response Team with identified procedures to assist local officials with important decisions regarding disaster response and recovery. Halff Associates executed a similar Disaster Response Contract with Galveston County in 2006 that was activated following Hurricane Ike in September 2008.

Step 1 – Select a consultant or consultants to assist Matagorda County and the cities of Bay City and Palacios during a disaster event. Define the engineering consultants' scope of work based on set salary and expenses rates. Matagorda County and the cities of Bay City and Palacios can select a single engineering consultant or the County and each community can select their own engineering consultant to assist with disaster recovery. Should the disaster event become a Presidential declared disaster the expenses associated with this mitigation action may be eligible for reimbursement from FEMA.

Step 2 – Execute a consultant "on call" contract to include response tasks:

1. Deployment of consultant's response team at Matagorda County and/or participating community request
2. Coordination with each community elected officials, floodplain administrator, emergency management coordinator, engineering consultants, LCRA representative, and Federal and state agencies.
3. Utilize Matagorda County, TWDB/TNRIS, FEMA, TCRFC, LCRA, GLO and other sources data such as NFIP flood loss data and GIS mapping
4. Identify and inspect damaged properties, areas, subdivisions and specific structures

5. Identify substandard housing that may be eligible for Federal and state funding for possible "demo-rebuild" projects
6. Assist County and communities with requests to FEMA for flood recovery mapping
7. Identify and survey high water marks (HWM) and prepare flood inundation maps
8. Monitor Flood Warning Sites and gauges that forecast downstream flooding
9. Prepare maps of damage areas from hurricane, tornado, HAZMAT or other event
10. Compile daily reports with photographs and engineering data
11. Document flood depths and calculate estimated damages to all damaged structures
12. Utilize FEMA's Residential Substantial Damage Estimator Program (RSDE), Substantial Damage Estimator (SDE) and Matagorda County Appraisal District data to classify and document substantially damaged structures
13. Assist Matagorda County and participating communities with damage inspections and preparation of Federal and State agency reports
14. Assist Matagorda County and participating communities with coordination efforts with State and Federal agencies
15. Assist Matagorda County and participating communities with applications for State and Federal funding
16. Assist Matagorda County and participating communities with design, construction and management of flood recovery (Public Assistance), Hazard Mitigation Grant Program (HMGP), Flood mitigation Assistance (FMA) and TDRA funded projects
17. Assist Matagorda County and participating communities with coastal construction requirements and coordination with GLO, USACE, TDEM, FEMA and others
18. Assist Matagorda County and participating communities with documentation and project closeout of State and Federally funded projects
19. Assist Matagorda County and participating communities with FEMA map revisions to correct errors in FIRMs.

Step 3 – Annually review and update, if necessary, consultants "on call" contracts

Responsibility:	Matagorda County (Disaster will be declared by county) City of Bay City City of Palacios FEMA/DHS Texas General Land Office (GLO) Texas Division of Emergency Management (TDEM) LCRA (Technical Assistance) TCRFC
Cost:	Execute "on call" contracts only after hazard events Cost will be hourly and dependent on magnitude of the event Each engineering consultant will be required to submit a rate schedule of salary and expenses
Funding Sources:	Texas Division of Emergency Management (TDEM) Public Assistance Funding available from a future Presidential declared disaster

FEMA – Flood Recovery Mapping funds
TDEM - Hazard Mitigation Grant Program (HMGP)
TDEM – Repetitive Flood Claims (RFC) Program
TWDB – Flood Mitigation Assistance (FMA) Program
TWDB – Severe Repetitive Loss (SRL) Program
TWDB – Flood Protection Planning Grant and Loan Programs
NRCS – Steam Restoration Program
TDRA – Texas Department of Rural Affairs
Matagorda County and participating communities

Timing: Any disaster event during the 5 year plan life (2010-2015)

Beneficiaries: Matagorda County and participating communities
Property owners and citizens of Matagorda County

F-13 Installation of additional Stream and Precipitation Gauges in the Colorado Watershed

This Action Item is to identify sites where additional stream and precipitation gauges are needed in Matagorda County and coordinate installation requests with the USGS, LCRA and NWS. In 2008, LCRA installed a stream flow gage near the Town of Matagorda on the Colorado River and USGS and NWS maintain four gauges in Matagorda County: two "real time" USGS gauges and two precipitation gauges The USGS real time flow gages can be viewed on line at http://waterdata.usgs.gov/tx/nwis/current/?type=flow .

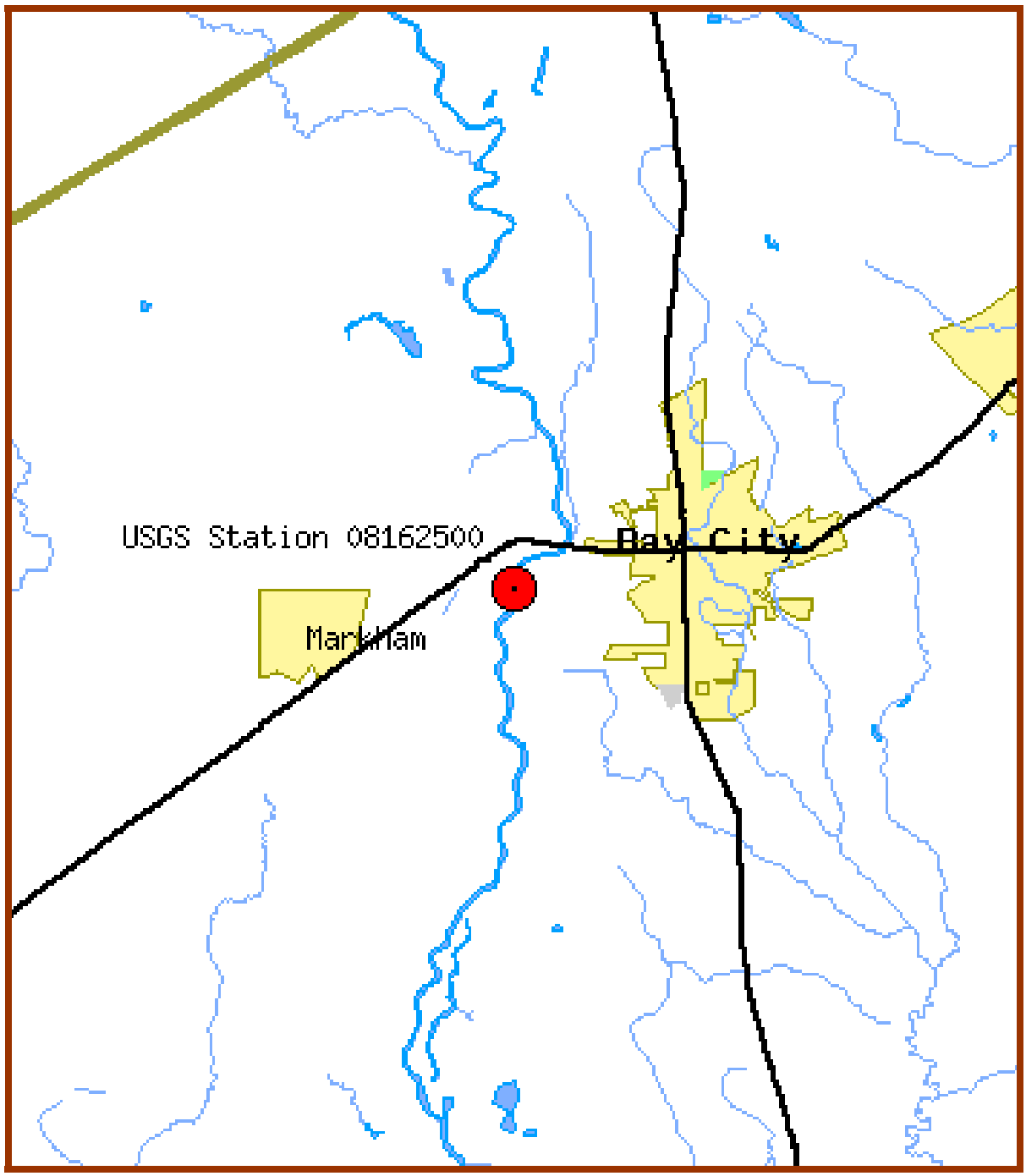


Figure 35: Site Map for USGS Station 08162500 near Bay City, Texas

Streamflow records for the Colorado River gage near Bay City are summarized below:

Matagorda County, Texas
Hydrologic Unit Code 12090302
Latitude 28°58'26", Longitude 96°00'44" NAD27
Drainage area 42,240 square miles
Contributing drainage area 30,837 square miles

Water Year	Date	Gage Height (feet)	Stream-flow (cfs)	Water Year	Date	Gage Height (feet)	Stream-flow (cfs)
1869	Jul. 1869	56.1[5]	[7,B]	1973	Jun. 15, 1973	38.70	60,800[6]
1914	Dec. 10, 1913	56.1[5]	[7]	1974	Sep. 16, 1974	32.14	38,400[6]
1922	May 08, 1922	55.4[5]	[7]	1975	May 28, 1975	34.45	48,900[6]
1929	Jun. 1929	55.0[5]	[7,B]	1976	Apr. 22, 1976	23.47	19,900[6]
1935	Jun. 22, 1935	54.6[5]	[7]	1977	Apr. 24, 1977	34.20	50,300[6]
1937	Oct. 05, 1936	52.2[5]	[7]	1978	Sep. 15, 1978	22.96	19,700[6]
1938	Aug. 02, 1938	53.4[5]	[7]	1979	Jun. 09, 1979	29.90	40,400[6]
1940	Jul. 04, 1940	46.60	83,300[7]	1980	May 19, 1980	19.20	14,300[6]
1941	Nov. 27, 1940	47.6[5]	[7]	1981	Jun. 18, 1981	30.95	42,100[6]
1948	May 28, 1948	22.73	6,390[6]	1982	Nov. 03, 1981	32.48	46,400[6]
1949	Apr. 28, 1949	34.00	36,000[6]	1983	May 23, 1983	22.90	22,600[6]
1950	Jun. 04, 1950	30.51	24,800[6]	1984	Oct. 17, 1983	16.02	10,700[6]
1951	Jun. 07, 1951	25.75	12,000[6]	1985	Oct. 25, 1984	24.60	24,500[6]
1952	May 29, 1952	29.07	20,100[6]	1986	Nov. 28, 1985	24.23	23,600[6]
1953	May 01, 1953	30.00	23,300[6]	1987	Jun. 17, 1987	34.32	50,500[6]
1954	Dec. 05, 1953	24.83	10,000[6]	1988	Mar. 19, 1988	18.24	12,200[6]
1955	May 21, 1955	25.74	11,900[6]	1989	May 16, 1989	14.60	7,740[6]
1956	Oct. 10, 1955	20.95	4,460[6]	1990	Feb. 22, 1990	13.74	6,720[6]
1957	May 01, 1957	41.83	53,000[6]	1991	Apr. 16, 1991	24.04	23,200[6]
1958	Oct. 17, 1957	42.77	59,200[6]	1992	Dec. 27, 1991	38.90	69,600[6]
1959	Apr. 13, 1959	34.48	34,200[6]	1993	Jun. 22, 1993	30.28	38,500[6]
1960	Jun. 26, 1960	46.40	84,100[6]	1994	May 17, 1994	18.69	12,000[6]
1961	Sep. 15, 1961	44.09	66,400[6]	1995	Oct. 20, 1994	38.67	71,100[6]
1962	Nov. 15, 1961	29.80	21,000[6]	1996	Jun. 26, 1996	16.76	12,200[6]
1963	Feb. 22, 1963	22.69	8,580[6]	1997	Mar. 19, 1997	29.29	37,900[6]
1964	Sep. 19, 1964	21.96	7,800[6]	1998	Oct. 15, 1997	26.09	33,000[6]
1965	May 20, 1965	31.05	27,000[6]	1999	Oct. 24, 1998	40.95	81,800[6]
1966	Dec. 06, 1965	25.64	15,200[6]	2000	Jun. 12, 2000	12.98	7,380[6]
1967	Sep. 23, 1967	27.50	19,000[6]	2001	Sep. 01, 2001	22.36	22,800[6]
1968	Jun. 26, 1968	37.49	49,500[6]	2002	Jul. 16, 2002	27.05	33,000[6]
1969	Feb. 23, 1969	27.92	24,200[6]	2003	Nov. 08, 2002	32.56	48,300[6]
1970	May 19, 1970	26.34	21,900[6]	2004	Jun. 26, 2004	24.38	25,300[6]
1971	Oct. 25, 1970	24.76	19,400[6]	2005	Nov. 27, 2004	41.73	73,800[6]
1972	May 13, 1972	27.34	24,600[6]	2006	Jul. 26, 2006	12.53	6,930[6]
				2007	Jul. 05, 2007	31.81	40,800[6]

?Peak Gage-Height Qualification Codes.
5 -- Gage height is an estimate
?Peak Streamflow Qualification Codes.
6 -- Discharge affected by Regulation or Diversion
7 -- Discharge is an Historic Peak
B -- Month or Day of occurrence is unknown or not exact

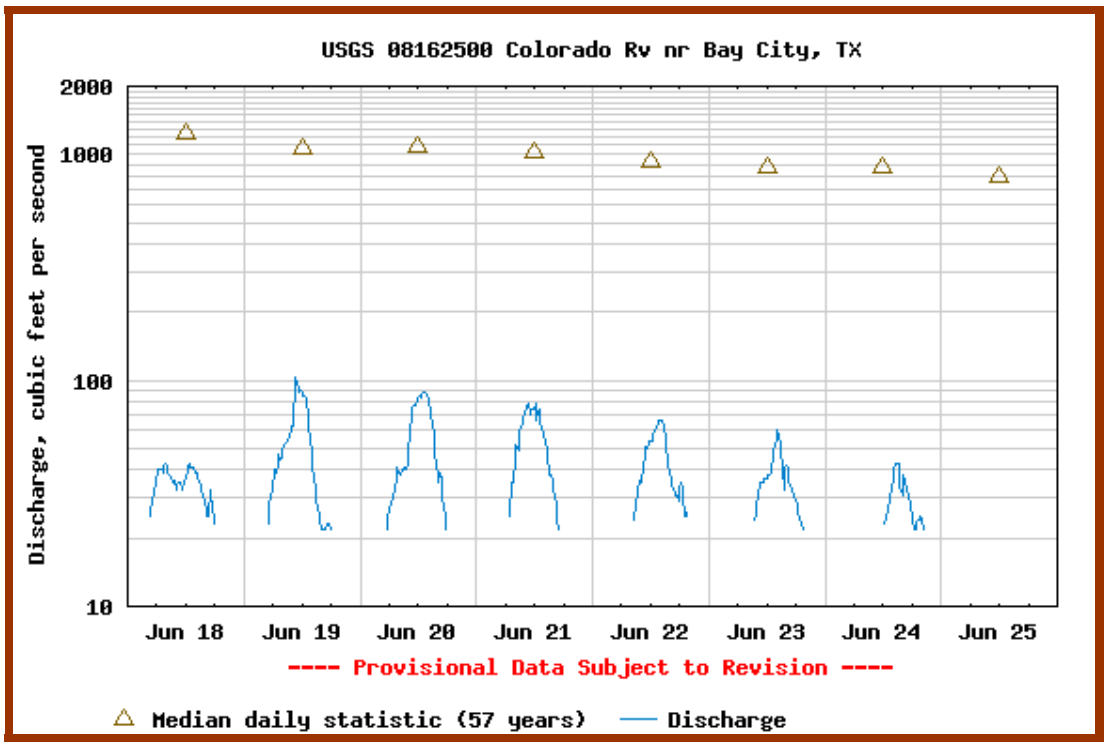
AVAILABLE DATA for the Colorado River Gage at Bay City:

Data Type	Begin Date	End Date	Count
Real-time	-- Previous 60 days --		
Daily Data			
Discharge, cubic feet per second	1948-05-01	2009-05-30	22292
Gage height, feet	1996-07-03	2009-06-25	4359
Daily Statistics			
Discharge, cubic feet per second	1948-05-01	2009-01-01	20610
Gage height, feet	1996-07-03	2008-03-23	4189
Monthly Statistics			
Discharge, cubic feet per second	1948-05	2009-01	
Gage height, feet	1996-07	2008-03	
Annual Statistics			
Discharge, cubic feet per second	1948	2009	
Gage height, feet	1996	2008	
Peak streamflow	1869-07-00	2007-07-05	69
Field measurements	1940-07-03	2009-05-12	651
Field/Lab water-quality samples	1974-10-16	2001-06-26	29

Additional Data Sources	Begin Date	End Date	Count
Instantaneous-Data Archive **offsite**	1990-10-01	2007-09-30	276104
Annual Water-Data Report (pdf) **offsite**	2005	2008	4

OPERATION: Record for this site is maintained by the USGS Texas Water Science Center

Email questions about this site to Texas Water Science Center Water-Data Inquiries



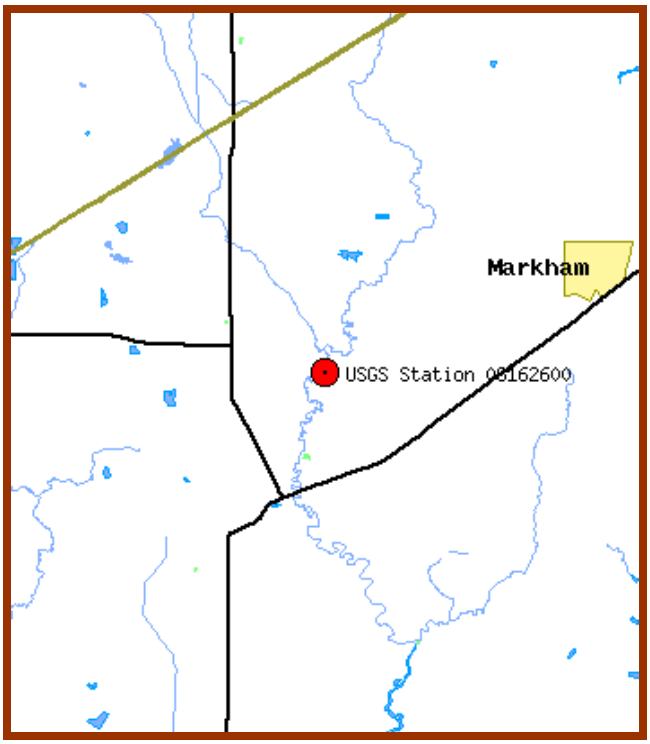
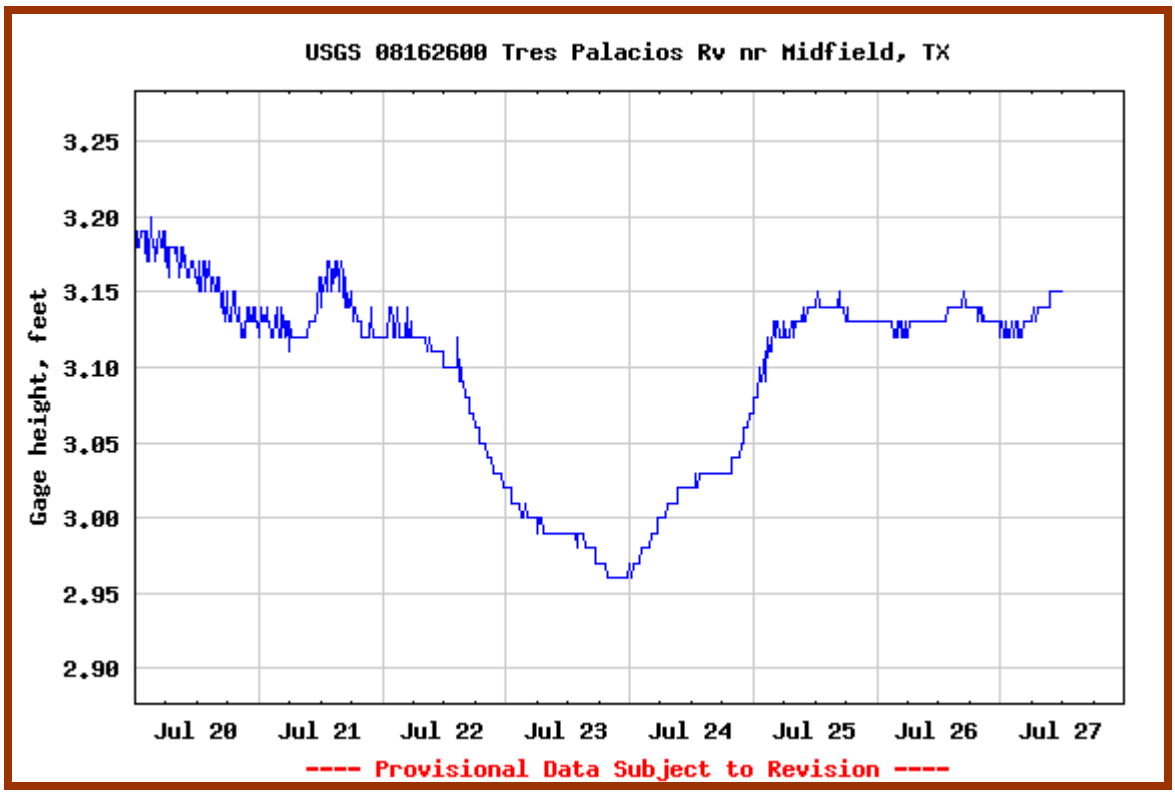


Figure 36: Site Map for USGS 08162600 Tres Palacios River near Midfield, Texas

DESCRIPTION:
Latitude 28°55'40", Longitude 96°10'15" NAD27
Matagorda County, Texas, Hydrologic Unit 12100401
Drainage area: 145 square miles
Contributing drainage area: 145 square miles,
Datum of gage: 5.38 feet above sea level NGVD29

Water Year	00060, Discharge, cubic feet per second
1971	131.4
1972	121.6
1973	281.4
1974	155.7
1975	135.5
1976	76.4
1977	98.8
1978	89.4
1979	307.1
1980	105.2
1981	176.0
1982	169.5
1983	205.3
1984	143.5
1985	268.8
1986	42.2
1987	170.2
1988	47.3
1989	59.9
1990	66.2
1991	155.7
1992	325.4
1993	217.3
1994	84.2
1995	269.3
1996	144.4
1997	320.5
1998	237.4
1999	112.0
2000	60.6
2001	180.6
2002	126.1
2003	203.3
2004	230.4
2005	202.4
2006	83.8
2007	317.2
2008	78.4



The LCRA website, www.lcra.org provides access to the LCRA HYDROMET System.

The LCRA website www.lcra.org contains rain and weather surveillance information, which is updated in 5 minute intervals.

In 2008, the LCRA installed a Crest Stage Gauge on the Colorado River at the Town of Matagorda to capture storm stage peaks.

Both the LCRA and the National Weather Service (NWS) monitors rain gauges in Matagorda County. LCRA has established a network of volunteers in Matagorda County that operate rain gauges and report data to LCRA that is incorporated into the LCRA HYDROMET System. LCRA is exploring the possibility of expanding the volunteer network in Matagorda County.

The estimated installation cost for a stream gauge meeting USGS and LCRA criteria is $20,000 with an estimated monthly maintenance cost of $1,000.

Responsibility:	Matagorda County City of Bay City City of Palacios Lower Colorado River Authority
Cost:	Phase 1 - 1 gage - $20,000 estimated installation cost Phase 2 - 1 gage - $ 20,000 estimated installation cost Phase 3 - Expand LCRA volunteer raingage network - $1,000 (estimated)

Phase 1 Annual maintenance cost $ 12,000 (estimated for Year 1)
Phase 2 Annual maintenance cost $ 24,000 (estimated after Year 1)
Phase 3 Annual maintenance cost $200 (estimated)

Funding Sources: HMGP – Texas Division of Emergency Management
Texas Water Development Board
Matagorda County
City of Bay City
City of Palacios
LCRA

Timing: Phased 2010 to 2015

Beneficiary: Countywide

F-14 Install Reverse 911 Emergency Warning System

This action item builds on the current Matagorda County 911 System. A mitigation evaluation (study) is recommended to determine the feasibility of installing a Matagorda County (countywide) Reverse 911 System. The evaluation should identify flood-prone or "at risk" structures that should be notified and possibly evacuated when flooding is eminent. By identifying structures and phone numbers, a Reverse 911 database could be created. The Matagorda County 911 System will allow coordination between the Matagorda County, City of Bay City and City of Palacios Office of Emergency Management, the National Weather Service (NWS), LCRA and law enforcement agencies and could issue Emergency Warnings via the Reverse 911 System.

Responsibility: Matagorda County (co-lead with cities of Bay City and Palacios)
City of Bay City (co lead with Matagorda County)
City of Palacios (co lead with Matagorda County)
HGAC (Technical Support)
HCFCD (Technical Support)

Cost: $10,000 estimated survey cost
$60,000 estimated equipment cost
$5,000 estimated cost for annual maintenance and training

Funding Sources: FEMA/DHS
HGAC
TDEM
LCRA/TCRFC
Matagorda County
City of Bay City
City of Palacios

Timing: Phased over 5 years (2010-2015)

Beneficiary: Countywide

F-15 "Storm Ready" Designation for Matagorda County Communities

There are no communities within Matagorda County that have been designated as a "Storm Ready" community by the National Weather Service (NWS). The NWS Office in Houston is available to assist Matagorda County communities to become "Storm Ready". The mitigation plan goal is to classify every community within Matagorda County as "Storm Ready". HGAC and/or LCRA/TCRFC may be able to assist with the coordination effort with the NWS.

Responsibility: Matagorda County (co-lead with cities of Bay City and Palacios)
City of Bay City (co lead with Matagorda County)
City of Palacios (co lead with Matagorda County)
NWS
HGAC
LCRA
TCRFC

Cost: Staff time under current budgets

Funding Sources: Not required

Timing: Phased over 5 years (2010-2015)

Beneficiary: Countywide

F-16 Backup Power for Matagorda County Critical Facilities

Install emergency generators or redundant power for the Matagorda County critical facilities such as the County Court House, City Halls (2), Public Safety Buildings, fire stations, police facilities, communication towers and fuel dispensing facilities. A study is recommended to evaluate options and estimate costs for Matagorda County and participating communities to select, design and construct backup power systems that can fulfill the need.

Following Hurricane Ike, Matagorda County applied to the Texas Department of Rural Affairs for 2008 Texas CDBG Disaster Recovery Supplemental Grant funds to purchase and install two (2) permanently affixed, diesel fueled emergency backup generators with automatic transfer switches and associated appurtenances, pads for generator mounting, make repairs and upgrades to equipment, and perform site work associated with construction.

As a possible alternative for additional funding, Matagorda County and participating communities can consider purchasing a mobile power generator as noted in the following *Texas Government Insider* article referencing action by the city of Victoria in July 2006:

VICTORIA CONSIDERS $100K MOBILE POWER GENERATOR

With a goal of keeping the city's water and sewer system operating during a sustained power loss, the city of Victoria is contemplating purchasing a mobile power generator at a cost of more than $100,000. The generator could be used for everything from operating pumps that send water to the treatment plant to keeping sewer system lift stations up and running. The 600-kilowatt generator is mounted on a trailer so that it can be moved to the location where it is needed. Victoria city officials remember a few years ago when Hurricane Claudette left the city without power for an extended period of time.

Responsibility:	Matagorda County OEM City of Bay City OEM City of Palacios OEM HGAC (Technical support) LCRA (Technical support) TCRFC (Technical support)
Cost:	$ 3,000 estimated study cost $30,000 estimated cost to install backup power per facility (Option 1) $20,000 estimated cost to install redundant power per facility (Option 2) $80,000 estimated cost to construct a secondary tower (Option 3) $100,000 estimated cost to purchase a 600 KW mobile power generator
Funding Sources:	TDEM (Governor's Division of Emergency Management) TDRA (Texas Department of Rural Affairs) Department of Homeland Security (FEMA) FEMA Project Initiative Program Matagorda County City of Bay City City of Palacios
Timing:	Study initiation in 2010 Phased construction from 2010 to 2015
Beneficiary:	Countywide

F-17 Inspect, Improve and Certify flood protection levees and seawalls in Matagorda County

In 2009, the Matagorda County Consolidated Reclamation and Drainage District hired Halff Associates to initiate a levee inspection and evaluation of the Town of Matagorda Levee and 42.05 miles of Colorado River levee through Bay City. This study will identify needed improvements and actions needed for certification of the various levees before they will be mapped by FEMA as providing flood protection. This mitigation action is to initiate the

recommended actions from the Matagorda County Consolidated Reclamation and Drainage District study.

Responsibility:	Matagorda County (co-lead with cities of Bay City and Palacios) City of Bay City (co lead with Matagorda County) City of Palacios (co lead with Matagorda County) LCRA (Technical Support)
Cost:	To be determined by the Drainage District Study
Funding Sources:	U.S Army Corps of Engineers TDEM – HMGP funding TWDB – FMA Program funding TDRA (Texas Department of Rural Affairs) LCRA/TCRFC Matagorda County City of Bay City City of Palacios
Timing:	Phased over 5 years (2010-2015)
Beneficiary:	Town of Matagorda Areas along the Colorado River protected by levees Coastal areas in Palacios and Matagorda County

F-18 Cottonwood Creek Technical Data Submittal or Letter of Map Revision (LOMR)

The Cottonwood Creek Flood Protection Plan, funded by a TWDB Flood Protection Planning Grant, was completed in 1990. The City of Bay City constructed Plan Alternative #5 to divert 700 cfs flow, during the 100-year flood event, to the Colorado River. The Diversion Project was constructed in the early 1990's however a request for a Letter of Map Revision (LOMR) was not submitted to FEMA to revise the Cottonwood Creek floodplain in the City of Bay City.

This mitigation action is to prepare and submit technical documentation regarding the Cottonwood Creek diversion project to FEMA to be incorporated into the ongoing Matagorda County remapping effort. The Matagorda County Flood Mitigation Planning Committee recommends that this mitigation action be initiated and completed as soon as possible to provide the technical information to FEMA to be incorporated into the Matagorda County remapping effort scheduled to be completed in mid 2010. However, if technical data cannot be submitted in time to be incorporated into the remapping effort, the Committee recommends that the technical information be submitted to FEMA as a request for a Letter of map revision (LOMR).

Responsibility	City of Bay City
Cost	To be determined by the Bay City engineering consultant

Funding Sources	City of Bay City
Timing	Mar 2010 - Submit technical date to FEMA June 2010 - FEMA incorporates updated technical information into the Matagorda County remapping effort Oct 2010 – FEMA publishes Preliminary DFIRM
Beneficiary	Bay City property owners in the Cottonwood Watershed

7.0 ADOPT THE PLAN (CRS ACTIVITY 511.9)

In accordance with CRS requirements, the Matagorda County Flood Mitigation Plan must be an official plan of each community and not an internal staff proposal. As such, the Matagorda County Commissioners Court and the City Council of each participating community must formally adopt the plan and later amendments to the plan in order to be eligible to receive Flood Mitigation Assistance (FMA) Program funding and to receive CRS credits for planning efforts.
Formal Action to Adopt the Plan:

The City Council of Bay City formally approved and adopted the Matagorda County Flood Mitigation Plan on December 17, 2010. See Resolution No. R-2009-24 in Appendix "C".

City of Palacios City Council formally approved and adopted the Matagorda County Flood Mitigation Plan on January 12, 2010. See Resolution No. 2010-R-1 in Appendix "C".

Matagorda County Commissioners Court formally approved and adopted the Matagorda County Flood Mitigation Plan on January 25, 2010. See Court Order in Appendix "C".

8.0 IMPLEMENTATION, EVALUATION AND REVISION OF PLAN (CRS ACTIVITY 511.10)

The Matagorda County Flood Mitigation Plan, while a stand alone plan funded by FEMA's Flood Mitigation Assistance Plan, will eventually be incorporated into the TCRFC Mitigation plan as the Matagorda County Mitigation Plan.

8.1 PROCEDURES FOR IMPLEMENTING, EVALUATING AND REVISING THE PLAN

The Matagorda County Flood Mitigation Planning Committee will monitor implementation of the Plan and conduct periodic and annual reviews to evaluate the effectiveness of the Plan as scheduled in CRS Section 511.2 and 511.3. Following formal Commissioners Court and each City Council adoption of the plan, the Matagorda County Flood Mitigation Plan will be implemented as outlined in previous sections.

The Matagorda County Floodplain Administrator located in the Environmental Health Department and the City of Bay City and City of Palacios floodplain administrators will be

responsible for ensuring the Flood Mitigation Plan is implemented in a timely manner. Other Flood Mitigation Planning Committee members will provide assistance and expertise for plan review when requested.

The Matagorda County Flood Mitigation Planning Committee reviewed the following possible funding programs for Matagorda County flood protection and drainage improvement projects:

a. **Hazard Mitigation Grant Program (HMGP) –** Matagorda County and cities of Bay City and Palacios have an approved Hazard Mitigation Plan and therefore are eligible for both Pre- and Post-Disaster mitigation grants from FEMA. Post Disaster Mitigation is state-wide competition for grant funding where Pre-Disaster Mitigation (PDM) is nation-wide competition for grant funding. Post Disaster Mitigation provides the better opportunity for funding because grant applications are reviewed, approved and administered by the Texas Division of Emergency Management.

b. **Pre-Disaster Mitigation (PDM)** – As mentioned above, PDM is a national competition grant program. In addition to having a reduced chance for grant approval, the nation-wide review and approval process can be time consuming and many PDM grants go unused because the applicants have changed their plans before the end of the 6 to 12 month grant award process is completed.

c. **Flood Mitigation Assistance (FMA) Program –** The Matagorda County Flood Mitigation Plan, when approved by FEMA, will establish eligibility for FMA Program funding. Matagorda County will be required to perform the required 5-year FMA Plan update to continue eligibility to receive FMA Program funding through 2015. FEMA's FMA Program funding is administered by the Texas Water Development Board.

d. **Severe Repetitive Loss Program** - Authorized by the National Flood Insurance Program Reform Act of 2004 (eligibility is for properties with four or more losses totaling $20,000 or two or more losses that exceed structure value). The Severe Repetitive Loss Program funding is funded by FEMA and administered by the Texas Water Development Board.

e. **Repetitive Flood Claims Program** – Authorized by the National Flood Insurance Program Reform Act of 2004 (eligibility is for flood-prone properties where the property is deed restricted for open space). The Repetitive Flood Claims (RFC) Program is funded by FEMA and administered by the Texas Division of Emergency Management.

f. **Demo-Rebuild –** Demo-rebuild is a pilot program that was introduced by FEMA in Florida and Louisiana (2003-2008) and funded under the state administered Hazard Mitigation Grant Program. This program has not been authorized for Texas communities however it is anticipated that FEMA funding will become available through TDEM and/or TWDB.

g. **FEMA Public Assistance (44CFR 206)** – FEMA Funding is available to Matagorda County and incorporated communities following a Presidential Declared Disaster. Matagorda County and the cities of Bay City and Palacios are eligible for Public Assistance funding to repair or replace public infrastructure and buildings damaged by the disaster event.

h. Texas Water Development Board (TWDB) Flood Protection Planning Grant-TWDB funding (50%) is available for applicant communities following an annual request for proposals**.**

i. FEMA Cooperating Technical Partner (CTP) & Map Maintenance Programs (2009-2014)

FEMA cost-shares with CTP's for mapping activities, such as the LCRA's CTP efforts to remap counties within the Lower Colorado River Watershed. FEMA initiated the Risk MAP program for FY 2009-FY2014. Under this program, LCRA is eligible to receive CTP funding to update the Matagorda County Flood Insurance Rate Maps and incorporate the mapping products from the Matagorda County Consolidated Reclamation and Drainage District studies.

j. U.S. Army Corps of Engineers Small Project and Aquatic Ecosystem Restoration Programs

USACE Fort Worth and Galveston Districts accepts applications from communities to fund "small projects" and stream restoration projects. Recommended flood protection and drainage improvement projects identified by the Matagorda County Consolidated Reclamation and Drainage District Study may be eligible for USACE funding.

k. NCRS Programs for urban erosion/sedimentation and stream restoration/stabilization projects.

The USDA/NRCS Office in Temple, Texas administers these programs. Recommended drainage improvement projects identified by the Matagorda County Consolidated Reclamation and Drainage District Study may be eligible for NRCS funding as Stream Restoration Projects.

l. Regional Funding Sources - Matagorda County is located within the HGAC Planning area. HGAC may become a funding source for regional drainage studies similar to successes experienced by the NCTCOG with receiving funding from the NRCS, USACE and FEMA. The HGAC may be a source of additional study funds, perhaps on cooperative basis.

m. Lower Colorado River Authority - Matagorda County is located within the LCRA service area and a member of the TCRFC. LCRA and the TCRFC have both funded projects that benefited Matagorda County. The LCRA is the Local Sponsor for the Lower Colorado River Flood Damage Reduction Project with the Corps of Engineers Fort Worth District.

n. Storm Water Utility Fee – Matagorda County and the cities of Bay City and Palacios may wish to consider SWU to fund needed stormwater improvement projects. Several major cities have successfully implemented SWU programs.

o. Drainage Impact Fee – Matagorda County and the cities of Bay City and Palacios may wish to consider Drainage Impact Fee to fund needed stormwater improvement projects. The HCFCD has successfully administered a drainage impact fee program that is watershed based to design and construct regional drainage and detention facilities.

p. Corps of Engineers/Galveston District - USACE 1140-1-211 "Support for Others" allows reimbursement up to 50% for a communities cost for planning, engineering and design, construction management, and operations (training) for flood protection and water resources projects.

8.2 IMPLEMENTATION, EVALUATION AND REVISION OF THE PLAN (CRS ACTIVITY 511.10)

Upon completion of Annual Plan Reviews, the Committee will prepare a Plan Review Report to result in a revision to the Plan based on input from the public, other agencies, and City Staff. The Matagorda County Flood Mitigation Plan will be resubmitted to the Commissioners Court and each City Council for approval only as required by TWDB to meet FMA Program requirements or by FEMA to meet CRS Requirements.

Following the recommendations of the Matagorda County Flood Mitigation Planning Committee, the Matagorda County Commissioners Court and each City Council formally adopted the Flood Mitigation Plan.

_____

Matagorda County
Flood Mitigation Planning Committee Planner-in-Charge

_____

City of Bay City
Matagorda County Flood Mitigation Planning Committee

_____

City of Palacios
Matagorda County Flood Mitigation Planning Committee

_____

Matagorda County Flood Mitigation Planning Committee

Attachment A

List of Acronyms

MHIP Acronyms

ACRONYM	DEFINITION
BFE	Base Flood Elevation
CTP	Cooperating Technical Partner
DFIRM	Digital Flood Insurance Rate Map
DHS	Department of Homeland Security
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FIRM	Flood Insurance Rate Map
FY	Fiscal Year
GAO	Government Accountability Office
GIS	Geographic Information System
IDIQ	Indefinite Delivery Indefinite Quantity (Contract)
KPI	Key Performance Indicator
KPP	Key Performance Parameter
LFD	Letter of Final Determination
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
MHIP	Multi-Year Flood Hazard Identification Plan
MIP	Mapping Information Platform
MNA	Mapping Needs Assessment
MOU	Memorandum of Understanding
MNUSS	Mapping Needs Update Support System
MSC	Mapping Service Center
NDEP	National Digital Elevation Program
NDOP	National Digital Orthophoto Program
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NSDI	National Spatial Data Infrastructure
NSGIC	National States Geographic Information Council
OMB	Office of Management and Budget
SFHA	Special Flood Hazard Area
TIP	Transportation Improvement Plan
USGS	United States Geological Survey

MHIP TERMS

TERM	DEFINITION
1-Percent-Annual-Chance Flood	The flood that has a 1 percent chance of being equaled or exceeded in any given year. Synonymous with 100-Year Flood and Base Flood.
Appeal	The formal objection to proposed or proposed modified Base Flood Elevations (BFEs), submitted by a community official or an owner or lessee of real property within the community during the statutory 90-day appeal period. An appeal must be based on data that show the proposed or proposed modified BFEs are scientifically or technically incorrect.
Approximate Study	A flood hazard study that results in the delineation of floodplain boundaries for the 1-percent-annual-chance flood, but does not include the determination of BFEs or flood depths.
Base Flood	See 1-Percent-Annual-Chance Flood.
Base Flood Elevation (BFE)	The elevation of a flood having a 1-percent chance of being equaled or exceeded in any given year.
Base Map	The map of the community that depicts cultural features (for example, roads, railroad, bridges, dams, culverts, drainage features, and corporate limits).
Case	A specific unit of work.
Catalog	A listing of data holdings.
Coastal Flooding	Flooding that occurs along the Great Lakes, the Atlantic and Pacific Oceans, and the Gulf of Mexico.
Coastal High Hazard Area	An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high-velocity wave actions from storms or seismic sources.
Community	Any State or area or political subdivision thereof, or any Indian tribe or authorized tribal organization, or Alaska Native village or authorized native organization, that has the authority to adopt and enforce floodplain management regulations for the areas within its jurisdiction.
Community Identification Number (CID)	A six-digit code used by FEMA to identify each community that is potentially subject to flood hazards.
Community Information System (CIS)	An Oracle database system used by FEMA to track and report on all communities identified by FEMA as potentially flood prone, especially with regard to mapping actions, including Letters of Map Change, taken by FEMA to identify flood hazards in each community.
Community Rating System (CRS)	A FEMA initiative, established under the NFIP, to recognize and reward communities that have implemented floodplain management measures beyond the minimum required by NFIP regulations. Under the CRS, those communities that choose to participate voluntarily may reduce the flood insurance premium rates for property owners in the community by taking these additional actions.
Compliance Period	The period that begins with the issuance of a Letter of Final Determination and ends when a new or revised FIRM becomes effective. During the compliance period, a community must enact and adopt new or revised floodplain management ordinances required for participation in the NFIP.

TERM	DEFINITION
Cooperating Technical Partners (CTP) Program	An innovative FEMA program to create partnerships between FEMA and participating NFIP communities, regional agencies, and State agencies that have the interest and capability to become more active participants in the FEMA Flood Hazard Mapping Program.
Countywide Format	A format used by FEMA to show flooding information for the entire geographic area of a county, including the incorporated communities in the county, on one map and in one report.
Cycle Time	The calendar time from approval of a need to the updating of the appropriate multi-hazard layer.
Data Set or Data File	A named collection of logically related data records arranged in a prescribed manner. The physical set of data of one data type being referred to or being used in the context of a data processing operation.
Department of Homeland Security (DHS)	A Federal agency, of which FEMA is a part, that is charged with ensuring the safety of the United States and its population.
Detailed Study	A flood hazard study that, at a minimum, results in the delineation of floodplain boundaries for the 1-percent-annual-chance flood and the determination of BFEs or flood depths.
Digital Flood Insurance Rate Map (DFIRM)	A FIRM that has been prepared as a digital product, which may involve converting an existing manually produced FIRM to digital format, or creating a product from new digital data sources using a GIS environment. The DFIRM product allows for the creation of interactive, multi-hazard digital maps. Linkages are built into an associated database to allow users options to access the engineering backup material used to develop the DFIRM, such as hydrologic and hydraulic models, flood profiles, data tables, Digital Elevation Models, and structure-specific data, such as digital elevation certificates and digital photographs of bridges and culverts.
Digital Flood Insurance Rate Map (DFIRM) Spatial Database	A database designed to facilitate collecting, storing, processing, and accessing data developed by FEMA, enabling mapping partners to share the data necessary for the DFIRM production and conversion process. Where possible, all mapping and engineering data elements are linked to physical geographic features and georeferenced. The use of a GIS as a component of the DFIRM spatial database provides the ability to georeference and overlay the mapping and engineering data, allowing the database to support a wide variety of existing and forthcoming FEMA engineering and mapping products.
e-LOMA	Computer software application for processing map amendments and revisions.
Effective Date	The date on which the NFIP map for a community becomes effective and all sanctions of the NFIP apply.
Effective Map	The NFIP map issued by FEMA that is in effect as of the date shown in the title block of the map as “Effective Date,” “Revised,” or “Map Revised.”
Federal Emergency Management Agency (FEMA)	The component of the Emergency Preparedness and Response Directorate within the U.S. Department of Homeland Security that oversees the administration of the NFIP.

TERM	DEFINITION
Federal Register	The document, published daily by the Federal Government, that presents regulation changes and legal notices issued by Federal agencies. FEMA publications in the Federal Register include Proposed, Interim, and Final Rules for BFE determinations; Compendium of Flood Map Changes published twice each year; and Final Rules concerning community eligibility for the sale of flood insurance.
Fiscal Year	The 12-month period that begins on October 1 and ends on September 30.
Flood	A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters or (2) the unusual and rapid accumulation or runoff of surface waters from any source.
Flood Insurance Rate Map (FIRM)	The insurance and floodplain management map produced by FEMA that identifies, based on detailed or approximate analyses, the areas subject to flooding during a 1-percent-annual-chance flood event in a community. Flood insurance risk zones, which are used to compute actuarial flood insurance rates, also are shown. In areas studied by detailed analyses, the FIRM shows BFEs to reflect the elevations of the 1-percent-annual-chance flood. For many communities, when detailed analyses are performed, the FIRM also may show areas inundated by 0.2-percent-annual-chance flood and regulatory floodway areas.
Flood Insurance Risk Zones	The zones, also referred to as "risk premium rate zones" and "flood insurance rate zones," shown on a FIRM or FHBM that are used to determine flood insurance premium rates for properties in the community covered by the FIRM or FHBM. The flood insurance risk zones include SFHA, (Zones A, A1-30, AE, A0, A99, AH, AR, AR/A, AR/A1-30, AR/AE, AR/A99, V, V1-30, VE, V0) and areas outside the SFHA (Zones B, X, D, M, N, P, E).
Flood Insurance Study (FIS)	The initial study of flood hazards performed for a community that does not have an effective FIRM or Flood Boundary and Floodway Map (FBFM). An FIS also may be referred to as a "Type 15 FIS" or a "Type 15 study." FEMA study contractors have traditionally performed FISs. However, communities, regional agencies, and States that are participating in the CTP initiative also may perform these types of flood map projects.
Flood Insurance Study (FIS) Report	A document, prepared and issued by FEMA, that documents the results of the detailed flood hazard assessment performed for a community. The primary components of the FIS report are text, data tables, photographs, and flood profiles.
Flood Map Modernization	Multi-Hazard Flood Map Modernization program, FEMA's plan to provide accurate flood hazard mapping data for areas of the Nation with the greatest flood risk.
Flood Map Project	Any activity undertaken by FEMA or a flood hazard mapping partner to create a new flood map or update an existing flood map, including detailed studies, approximate studies, and redelineations of floodplain boundaries based on updated topographic information.
Floodplain	A land area that is susceptible to being inundated by water from any source.
Floodplain Boundary Standard	The standard by which all flood maps are measured, requiring the map producer to match flood boundaries to the best-available topographic information and merging both in an updated, digital format.
Floodplain Management	The operation of a program of corrective and preventative measures for reducing flood damage, including, but not limited to, emergency preparedness plans, flood-control works, and floodplain management regulations.

TERM	DEFINITION
Floodplain Management Regulations	The zoning ordinances, subdivision regulations, building codes, health regulations, special-purpose ordinances, and other applications of enforcement used by a community to manage development in its floodplain areas.
Flood-prone Area	See floodplain.
Flood-prone Community	Any community that is subject to inundation by the 1-percent-annual-chance (base or 100-year) flood.
Flood Profile	A graph showing the relationship of water-surface elevation to location, with the latter generally expressed as distance above the mouth for a stream of water flowing in an open channel.
Floodway	See regulatory floodway.
Framework	A collection of technology from which items can be selected for a particular application. The elements in the collection are grouped because they are known to work well together to solve a particular problem set.
Geographic Information Systems (GIS)	A system of computer hardware, software, and procedures designed to support the capture, management, manipulation, analysis, modeling, and display of spatially referenced data for solving complex planning and management problems.
GEO-RAS	An ArcView GIS extension that provides the user with a set of procedures, tools, and utilities for the preparation of GIS data for importation into HEC-RAS and generation of GIS data from HEC-RAS output.
Geospatial One-stop	Initiative to reduce duplication among various GIS efforts throughout the U.S. Government.
Guidelines and Specifications for Flood Hazard Mapping Partners	FEMA's technical requirements, product specifications for Flood Hazard Maps and related NFIP products, and associated coordination and documentation activities. These Guidelines, organized into three volumes and 13 appendices, combine FEMA technical, programmatic, and administrative procedure publications, guidance documents, and memorandums regarding Flood Hazard Mapping.
H&H	Hydrology and Hydraulics (engineering analysis of water quantity and flow)
Hazard	An event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, and other types of loss or harm.
Hazard Mitigation Grant Program (HMGP)	The program, authorized under Section 404 of the Stafford Act, under which FEMA provides grants to state and local governments to implement long-term hazard mitigation measures after a presidential disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable implementation of mitigation measures during the immediate recovery from a presidentially declared disaster.
Hazards.fema.gov	The Web site for FEMA's Mapping Information Platform.
HTML	Hypertext Markup Language, a set of codes or "markups" that are inserted into plain text to create a Web page.
Hydraulic Analysis	An engineering analysis of a flooding source carried out to provide estimates of the elevations of floods of selected recurrence intervals.
Hydraulic Methodology	Analytical methodology used for assessing the movement and behavior of floodwaters and determining flood elevations and regulatory floodway data.
Hydraulics	The study of the dynamics of movement of a given amount of water in a watershed.

TERM	DEFINITION
Hydrologic Analysis	An engineering analysis of a flooding source carried out to establish peak flood discharges and their frequencies of occurrence.
Hydrology	The science encompassing the behavior of water as it occurs in the atmosphere, on the surface of the ground, and underground.
Indefinite-Delivery, Indefinite-Quantity (IDIQ)	A type of contract by which a service is provided an unspecified number of times, or a contractor who operates under such a contract.
Key Performance Indicator (KPI)	A statistical measurement of one of the Flood Map Modernization program's goals.
Key Performance Parameter (KPP)	The major measurement of program goal achievement; specifically, increasing safety for at least 92 percent of the Nation's population with the greatest flood risk.
Layer	An "overlay" of data, each of which normally deals with one thematic topic. Each overlay is registered to one another by the common coordinate system of the database. In a GIS, a layer or a theme represents a specific kind of data.
Legacy	An existing system that contains relevant and historical data.
Letter of Final Determination	A letter sent by FEMA upon conclusion of a study.
Levee	A man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.
Letter of Map Amendment (LOMA)	An official determination by FEMA that a property has been inadvertently included in an SFHA as shown on an effective FHBM or FIRM and is not subject to inundation by the 1-percent-annual-chance flood. Generally, the property is located on natural high ground at or above the BFE or on fill placed prior to the effective date of the first NFIP map designating the property as within an SFHA. Limitations of map scale and development of topographic data more accurately reflecting the existing ground elevations at the time the maps were prepared are the two most common bases for LOMA requests.
Letter of Map Change (LOMC)	A collective term used to describe official amendments and revisions to National Flood Insurance maps that are accomplished by a cost-effective administrative procedure and disseminated by letter.
Letter of Map Revision (LOMR)	A letter issued by FEMA to revise the FIRM, FBFM, and/or FIS report for a community to reflect a change in BFEs, floodplain and floodway boundary delineations, and coastal high hazard areas.
Letter of Map Revision Based on Fill (LOMR-F)	A Letter of Map Change issued by FEMA when FEMA determines that a legally defined parcel of land or structure has been elevated above the BFE based on the placement of earthen fill after the date of the first NFIP map.
Map Amendment	A change to an effective NFIP map that results in the exclusion from the SFHA of an individual structure or legally defined parcel of land that has been inadvertently included in the SFHA (that is, no alterations of topography have occurred since the date of the first NFIP map that showed the structure or parcel to be within the SFHA).
Map Revision	A change to an effective NFIP map that is accomplished by a LOMR or a physical map revision.

TERM	DEFINITION
Mapping Information Platform (MIP)	The name for the MOD team's information technology. This technology encompasses a program management workflow-based system, which has federation capabilities, community outreach capability, and a training system, all behind a common interface. This technology allows for personalization of content.
Mapping Needs Update Support System (MNUSS)	A computerized database system used by FEMA and its flood hazard mapping partners to compile information and manage needs assessment using the Mapping Needs Assessment Process.
Mapping Needs Assessment Process	The process by which FEMA identifies mapping needs nationwide by contacting states, regional agencies, and mapped participating communities for information; verifies the validity of the identified needs; and compiles information on those needs into a computerized database.
Metadata	Data about data. Metadata describes the data; for example, metadata about an image might describe the location where the image was taken, its resolution, etc.
MHIP@floodmaps.net	The e-mail address to which individuals, agencies, and organizations can send their comments about the MHIP.
Mitigation	A sustained action taken to reduce or eliminate long-term risk to people and property from flood hazards and their effects. Mitigation distinguishes actions that have a long-term impact from those are more closely associated with preparedness for, immediate response to, and short-term recovery from specific events.
Multi-Year Flood Hazard Identification Plan (MHIP)	A document that defines how FEMA will produce updated, digital flood-hazard data for areas with the greatest flood risk with 5 years of funding.
National Flood Insurance Program (NFIP)	The Federal program under which flood-prone areas are identified and flood insurance is made available to the owners of the property in participating communities.
National Flood Layer	A virtual national geo-database containing flood information that appears to users as a seamless database, although the data itself may be held centrally in MIP or may be held locally at various CTPs. Data is accessed via MIP.
New, Updated, or Validated Engineering Analysis	Varying levels of engineering analysis established by FEMA for mapping studies.
Open Standards	Refers to standards that were developed in an environment allowing for public comment and pertains to methods and formats that can be met by a number of vendors or organizations. The word "proprietary" is an antonym to "open."
Participating Community	Any community that voluntarily elects to participate in the NFIP by adopting and enforcing floodplain management regulations that are consistent with the standards of the NFIP.
Physical Map Revision (PMR)	A revision made by FEMA to a FIRM, FBFM, or FIS report based on community-supplied data. FEMA issues PMRs when (1) changes resulting from the requested revision are extensive, affecting significant portions of a FIRM panel or multiple FIRM panels; (2) revision will add significant SFHAs to the effective FIRM; or (3) revision will result in an increase in the BFEs and/or regulatory floodway.
Protest	An objection to any information, other than BFEs, shown on an NFIP map that is submitted by community officials or interested citizens through the community officials during the 90-day appeal period.

TERM	DEFINITION
Regional Offices	The FEMA offices located in Boston, Massachusetts; New York, New York; Philadelphia, Pennsylvania; Atlanta, Georgia; Chicago, Illinois; Denton, Texas; Kansas City, Missouri; Denver, Colorado; Oakland, California; and Bothell, Washington.
Regulatory Floodway	A floodplain management tool that is the regulatory area defined as the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the base flood discharge can be conveyed without increasing the BFEs more than a specified amount. The regulatory floodway is not an insurance rating factor.
Risk Class	One of five categories of FIRMs, depending on flood risk.
Scoping	The process of determining the activities that a study must include in order to satisfy a funded need.
Special Flood Hazard Area (SFHA)	The area delineated on a NFIP map as being subject to inundation by the base flood. SFHAs are determined using statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with a community; floodplain topographic surveys; and hydrologic and hydraulic analyses.
Standards	Standards are methods, procedures, and formats defined to which processes and data must adhere to be acceptable. The standards used on this program are "open standards," meaning that they are not proprietary to any one company or group of companies. In general, our standards will have been developed via the Open GIS Consortium. In many cases, standards are not yet developed, particularly for intermediate engineering data, such as inputs to models. In this case, we will implement WISE standards as a starting point.
State	Any U.S. state, the District of Columbia, the territories and possessions of the United States, the Commonwealth of Puerto Rico, and the Trust Territory of the Pacific Islands.
Study Cycle	The flood study processing steps including needs assessment, project scoping, data development, processing, distribution, and maintenance.
Watershed	An area of land that drains into a single outlet and is separated from other drainage basins by a divide.
Web Services	A technology that allows a server to provide services over the Internet. Web services are self-contained, modular applications that can be described, published, located, and invoked over a network. Web services perform encapsulated business functions, ranging from simple request-reply to full business process interactions.
Work Map	Floodplain mapping submitted to FEMA by a mapping partner, reflecting the results of a flood study or other mapping activity. The work map depicts floodplain boundaries, regulatory floodway boundaries, BFEs, and cross-sections, and provides the basis for presentation of this information on a FIRM.

Attachment B

Public Notification of Public Meetings; Matagorda County Bench Mark Database

Bay City The Tribune
Matagorda County's leading news source since 1845

Public Meeting

Regarding the Matagorda County Flood Mitigation Plan

Monday – December 14, 2009 – 9:30 a.m.

Matagorda County Commissioners Court

1700th Street, 3rd Floor

Bay City, TX

Bay City
The Tribune
Matagorda County's leading news source since 1845

----------Thursday, December 3, 2009----------

get grants

BY ADRIANA ACOSTA
AACOSTA@VICAD\.COM

Volunteer Fire Departments from Sargent and Midfield have been approved grants to purchase equipment. Grants are from the Texas Forestry Service and total amounts are $11,800 to purchase lightweight bunker gear. A ten percent match was approved and $1,180 will be included.

A grant for $15,5,000 to the Sargent Volunteer Fire Department was awarded from the Texas Forestry Service in order to purchase a large brush truck. A ten percent match was approved and $15,500 will be included.

Midfield Volunteer Fire Department will be awarded a $78,000 grant from the Texas Forestry Service in order purchase a small grass truck. A ten percent match was approved and $7,800 will be included.

All grants were approved on the Monday, December 7 Matagorda County Commissioners' Court Meeting.

Van Vleck FFA p

On November 21, 2009 seven of the Van Vleck FFA chapter's leadership teams competed in the Area III LDE Contest. They placed in the following way:

10th place Job Interview

Chelsea Barrie

6th place Ag Issues

Sean Keller, Lyndee Dement and Baylee Brooks

6th place Public Relations

Shelbie Murry, Sydney Bludau, Haydn Hutson, and Chasidi Jackson

5th place Jr. Chapter conducting

Meg Dement, Megan Stell, Orrin King, Bailye Foltyn, Marcus Brown, Michalela Popek, Lyndee Dement, Bran
Lacy Humpreys

4th place Sr. Team

Kasie Wilson, Kassidy Pruett

3th place Sr. conducting

Selena Jimen
, Chelsea Barr
cle, Alana Huro
Lacy Woods, M
Sam Poretto,
Connel

1st place an Qualifier Jr.

Kalvin Single
talvo, and M
Placed 7th at S

NOTICE OF MEETING
MATAGORDA CO. CONSERVATION & RECLAMATION DISTRICT NO. 1

In accordance with provisions of Article 6252-17, of Vernon's Civil Statutes, as amended, Matagorda County Conservation & Reclamation District No. 1, an agency of the County of Matagorda, whose address is 491 CR 415, Bay City, Texas 77414, hereby gives notice of a meeting of its Board of Directors to be held on the 3rd Floor, in the Kitchen Area at the Matagorda County Courthouse in Bay City, TX on Wednesday, September 2, 2009 at 10:00 a.m.

Dwight Vavra

Dwight Vavra, Director

1. **Call Meeting to Order**
2. **Recognize Visitors**
3. **Read and Approve Minutes from Previous Meeting**
4. **Review, Discuss, and Adopt 2009 Proposed Tax Rate**
5. **Halff and Associates' Levee Study Update and Report**
6. **Adopt Matagorda Ring Levee Structure Resolution**
7. **Discuss Flag Pole Variance**
8. **Discuss and Adopt Matagorda Ring Levee Use Agreement With County**
9. **Discuss the LCRA Interlocal Agreement**
10. **Discuss and Accept Reed & Associates Contract**
11. **Old Business**
12. **Report from Conservation & Reclamation's Attorney**
13. **Accept Investment Report**
14. **Matagorda Ring Levee Report**
15. **Approve and Pay Bills**
16. **Adjourn**

Feb 11, 2009 - Bay City Tribune

Flood mitigation plan efforts started

Public invited to take part by questionnaire

STAFF REPORTS
Bay City Tribune

Matagorda County has initiated planning efforts to prepare a county-wide Flood Mitigation Plan to compliment the Texas Colorado River Floodplain Coalition (TCRFC) "all-hazards" mitigation plan that includes Matagorda County, Bay City and Palacios.

Currently Matagorda County and all communities participate in the National Flood Insurance Program (NFIP).

One of the purposes of the NFIP is to identify and mitigate the impact of floods and natural disasters including the regulation of development within special flood hazard areas.

A benefit of participation in the flood insurance program allows citizens within each community to purchase flood insurance at an affordable rate.

Matagorda County, Bay City and Palacios are subject to flooding from coastal storms and overflows from the Colorado River.

Fortunately, Matagorda County escaped the most severe wrath of Hurricane Ike but should be prepared for future flood events.

In 2008, the Matagorda County Commissioners Court announced the initiation of planning efforts to prepare the county's flood mitigation plan and approved hiring Halff Associates, Inc. to assist with the planning effort.

Representatives for the county and both incorporated cities met on Jan. 22 to initiate the planning effort, outlining how the plan will be developed, how to encourage public participation in the planning process, and identifying "other agencies" that need to be involved in the planning process.

A flood mitigation plan questionnaire was a result of the meeting as a tool to encourage public participation in the planning process.

The questionnaire is a short, seven question survey that will record a participant's flood history, location and suggestions for the flood mitigation plan.

The Texas Water Development Board has awarded $50,000 to Matagorda County in federal funding through FEMA's Flood Mitigation Assistance (FMA) Program.

The participating entities will be required to fulfill both the Texas Water Development Board and the Federal Emergency Management Agency (FEMA) planning requirements.

The flood mitigation plan — scheduled to be completed in July 2009 — will be formally presented at a public meeting prior to formal adoption by commissioner's court and the two city councils.

Matagorda County and participating communities will also evaluate participation in FEMA's Community Rating System (CRS) Program.

Participation in the community rating system can result in reductions in flood insurance policy premiums for properties located within the unincorporated areas of Matagorda County.

The CRS program is available only to communities that participate in the National Flood Insurance Program (NFIP) and have adopted a floodplain management program that exceeds NFIP guidelines.

Only 46 communities in Texas participate in the CRS program and those communities receive annual flood insurance premium reductions based on their CRS classification.

Adoption of an approved flood mitigation plan is an approved activity for a CRS community and establishes eligibility for Matagorda County to receive Flood Mitigation Assistance (FMA) Project funding.

The public is invited to participate in the planning process, which will be conducted under the supervision of Lisa Krobot, CFM, Matagorda County floodplain administrator.

Krobot will receive flood mitigation plan questionnaires from the public to help guide the planning effort.

To provide input via the questionnaire, contact Krobot at 979-244-2717 or stop by the Matagorda County Environmental Health office located on the first floor of the county annex building at 2200 Seventh Street in Bay City.

Matagorda County Flood Mitigation Plan/Survey

Matagorda County had initiated planning efforts to prepare a county-wide Flood Mitigation Plan to compliment the Texas Colorado River Floodplain Coalition (TCRFC) "all-hazards" Mitigation plan that includes Matagorda County and the cities of Bay City and Palacios. Currently Matagorda County and all communities participate in the National Flood Insurance Program (NFIP). One of the purposed of the NFIP is to identify and mitigate the impact of floods and natural disasters including the regulation of development within special flood hazards areas. A benefit of participation in the NFIP allows citizens within each community to purchase flood insurance at an affordable rate.

Matagorda County (county wide) Flood Insurance Coverage and Claims

Coverage ($)	$673,527,500
Policies in Force	3,789
Claims Paid	1,309
Claims Paid ($)	$10,055,261
Policy Premiums ($)	$2,432,000 per year

Matagorda County and the cities of Bay City and Palacios are subject to flooding from coastal storms and overflows from the Colorado River. Fortunately, Matagorda County escaped the most severe wrath of Hurricane Ike but Matagorda County wants to be prepared for future flood events.

In 2008, the Matagorda County Commissioners Court announced the initiation of planning efforts to prepare the Matagorda County Flood Mitigation Plan and approved hiring Halff Associates, Inc. to assist with the planning effort.

Representatives for Matagorda County and the cities of Bay City and Palacios met on January 22, 2009 to initiate the planning effort, to outline how the plan will be developed, how to encourage public participation in the planning process, and identify "other agencies" that need to be involved in the planning process. A Flood Mitigation Plan Questionnaire is attached to encourage public participation in the planning process.

The Texas Water Development Board has awarded $50,000 to Matagorda County in federal funding though FEMA's Flood Mitigation Assistance (FMA) Program. Matagorda County and the cities of Bay City and Palacios will be required to fulfill both the Texas Water Development Board and the Federal Emergency Management Agency (FEMA) planning requirements. The Matagorda County Commissioners Court and the City Council of Bay City and Palacios will formally present the Flood Mitigation Plan, which is scheduled to be completed in July 2009, at a public meeting prior to formal adoption.

Matagorda County and participating communities will also evaluate participation in FEMA's Community Rating System (CRS) Program. Participation in CRS can result in reductions in flood insurance policy premiums for properties located within the unincorporated areas of Matagorda County. The CRS Program is available only to communities that participate in the National Flood Insurance Program (NFIP) and have adopted a floodplain management program that exceeds the NFIP guidelines. Only 46 communities in Texas participate in the CRS program and those communities receive annual flood insurance premium reduction based on their CRS classification. Adoption of an approved Flood Mitigation Plan is an approved activity for a CRS community and establishes eligibility for Matagorda County to receive Flood Mitigation Assistance (FMA) Project funding.

The public is invited to participate in the planning process, which will be conducted under the supervision of Ms. Lisa Krobot, CFM, Matagorda County Floodplain Administrator, (979) 244-2717. Ms. Krobot will receive Flood Mitigation Plan Questionnaires from the public to help guide the planning effort.

Lisa S. Krobot, CFM
Mat.Co. Environmental Health
Office: (979) 244-2717

FLOOD MITIGATION PLAN QUESTIONNAIRE

MATAGORDA COUNTY FLOOD MITIGATION PLAN

Please take a few minutes to identify your hazard concerns using this Questionnaire and return it to Matagorda County Environmental Health by March 15, 2009 if possible. The Matagorda County Flood Mitigation Planning Committee will review the completed questionnaires and recommendations will be considered in development of the Flood Mitigation Plan. Current target completion date for the Matagorda County Plan is July 2009.

YOUR INPUT IS IMPORTANT!!!!!

1. Do you live in a designated flood hazard area? ___ Yes ___ No ___ Unknown
2. Do you currently carry flood insurance? ___ Yes ___ No ___ Unknown
3. Has your home ever flooded with water in the house? ___ Yes ___ No
4. Dates your home has flooded: _____ _____ _____
   Flooding Source: _____ Depth of water in home: _____
5. Do you live in: Matagorda County (unincorporated area) _____
   City of Bay City _____
   City of Palacios _____
6. What do you recommend to reduce flood hazards in Matagorda County?
7. Name and Address – or area where you live or work

Attach additional sheets if necessary

Your input is important. This questionnaire will provide valuable insight in developing the goals and objectives for the Matagorda County Flood Mitigation Plan. Please return completed questionnaires to:

Matagorda County Environmental Health **or email to: lkrobot@co.matagorda.tx.us**

2200 Seventh Street, 1st Floor
Bay City, Texas 77414

Matagorda County Bench Marks Updated 2/24/09

Designation	PID	USGS Quad	NAVD 1988	NGVD 1929	Vertical Order	Stability	Recovery Status and Date	Remarks	Nearest Stream	Nearest Roadway
AC Series										
PSX A	AC5825	Turtle Bay	11.7		HOR 0	C	Good 2008			
3R1 A	AC5963	Bay City	38.5		HOR 0	C	Good 2008			
AH Series										
MATA 1991	AH5955	Matagorda SW	13.0		HOR 3	B	Good 1991			
AI Series										
J 584 Reset	AI3493	Turtle Bay	14.8	15.1	3	C	Good TXDOT 1999			
AM Series										
A 1256	AM0114	Bay City	14.00	14.026	1	B	Not Found 2006			
B 1256	AM0115	Bay City	13.85	13.876	1	B	Not Found 1998			
C 1256	AM0116	Bay City	13.76	13.791	1	B	Good 2006			
D 1256	AM0117	Bay City	11.27	11.307	1	B	Good 2006			
E 1256	AM0118	Bay City	10.36	10.394	1	B	Good 2006			
F 1256	AM0119	Bay City	9.97	10.009	1	B	Good 2006			
G 1256	AM0120	Bay City	9.68	9.716	1	B	Good 2006			
H 1256	AM0121	Bay City	10.14	10.178	1	B	Good 2006			
S 755	AM0122	Bay City	8.84	8.879	1	C	Good 1998			
J 1256	AM0123	Bay City	10.72	10.757	1	B	Good 2006			
V 455	AM0124	Bay City	10.35	10.393	1	B	Good 2006			
K 1256	AM0125	Bay City	9.97	10.013	1	B	Good 2006			
L 1256	AM0126	Bay City	10.20	10.238	1	B	Good 2006			
M 1256	AM0127	Bay City	10.88	10.922	1	B	Good 2006			
H 572	AM0128	Wadsworth	9.78	9.816	1	C	Not Found 1998			
J 572 Reset	AM0129	Wadsworth	7.54	7.585	1	C	Not Found 1998	Reset 1951		
N 1256	AM0130	Wadsworth	9.28	9.323	1	B	Good 2006			
P 1256	AM0132	Wadsworth	7.28	7.33	1	B	Not Found 2006			
Q 1256	AM0133	Wadsworth	5.28	5.327	1	B	Good 2006			
R 1256	AM0134	Wadsworth	5.69	5.738	1	B	Good 2006			
S 1256	AM0135	Wadsworth	6.50	6.548	1	B	Good 2006			
T 1256	AM0136	Wadsworth	2.46	2.507	1	B	Good 2006			
J 585	AM0137	Wadsworth	2.33	2.375	1	C	Good 1951			
K 585	AM0138	Wadsworth	5.88	5.927	1	C	Good 1951			
V 585	AM0139	Wadsworth	7.24	7.290	1	B	Not Found 2006			
U 1256	AM0140	Matagorda	5.24	5.293	1	B	Good 2006			
V 1256	AM0141	Matagorda	4.12	4.178	1	B	Good 2006			
W 1256	AM0142	Matagorda	1.96	2.011	1	B	Good 2006			
Z 1256	AM0143	Matagorda	2.68	2.734	1	C	Good 2006			
W 51	AM0145	Matagorda	2.80	2.859	1	B	Not Found 2006			
V 51	AM0146	Matagorda	3.87	3.929	1	B	Not Found 2006			
Mat Lon RM2	AM0147	Matagorda	2.70	2.76	3	C	Not Found 2006	Matagorda Longitude RM 2		
Mat Lon 1931	AM0148	Matagorda	3.31	3.36	3	B	Good 2006	Matagorda Longitude 1931		
Mat Lon RM1	AM0149	Matagorda	2.86	2.91	3	C	Poor 2006	Matagorda Longitude RM 1		
X 755	AM0150	Matagorda	2.58	2.628	1	C	Good 1978			
S 51	AM0151	Matagorda	3.84	3.889	1	C	Poor 1978			
W 755	AM0152	Matagorda	5.05	5.095	1	C	Good 1951			
R 51	AM0153	Wadsworth	6.86	6.903	1	C	Good 1943			
N 51	AM0154	Bay City	10.61	10.643	1	C	Poor 1978			
Q 755	AM0155	Bay City	9.21	9.248	1	C	Poor 1978			
M 755	AM0156	Bay City	14.93	14.955	1	C	Not Found 1998			
N 755	AM0157	Bay City	13.01	13.044	1	C	Not Found 1998			
U 51	AM0158	Matagorda	3.97	4.031	1	B	Not Found 1978			
T 51	AM0160	Matagorda	3.68	3.732	1	C	Not Found 1978			
Q 51	AM0165	Wadsworth	10.28	10.322	1	B	Not Found 2006			
V 755	AM0166	Wadsworth	9.94	9.981	1	C	Not Found 1998			
U 755	AM0167	Wadsworth	10.32	10.357	1	C	Not Found 1998			
P 755	AM0169	Bay City	12.57	12.599	1	C	Not Found 1978			
P 51	AM0170	Wadsworth	10.42	10.460	1	B	Not Found 1998			
U 581	AM0171	Wadsworth	5.82	5.874	1	C	Not Found 2006			
T 581	AM0172	Wadsworth	4.95	4.996	1	C	Not Found 2006			
T 755	AM0173	Bay City	9.44	9.481	1	C	Not Found 1978			
R 755	AM0174	Bay City	8.97	9.002	1	C	Not Found 1978			
G 1206	AM0175	Bay City	15.32	15.35	1	C	Not Found 1996			
Z 51	AM0176	Bay City	14.01	14.035	1	C	Good 1972			
K 755	AM0177	Bay City	13.94	13.964	1	C	Good 1972			

Matagorda County Bench Marks

Designation	PID	USGS Quad	NAVD 1988	NGVD 1929	Vertical Order	Stability	Recovery Status and Date	Remarks	Nearest Stream	Nearest Roadway
L 755	AM0178	Bay City	12.24	12.270	1	C	Good 1972			
Y 51	AM0179	Bay City	47.10	47.210	1	C	Good 2006			
U 455	AM0180	Bay City	46.90	47.010	1	C	Good 2006			
I 51	AM0182	Bay City	55.50	55.600	1	B	Not Found 1996			
J 51	AM0183	Bay City	56.30	56.400	1	B	Good 2006			
K 51	AM0184	Bay City	55.00	55.130	1	B	Good 2006			
L 51	AM0185	Bay City	55.60	55.690	1	B	Good 2006			
BC Mag AZ	AM0186	Bay City	51.90	51.990	1	C	Good 2006	Bay City Magnetic AZ Mark		
C 456	AM0187	Bay City	52.00	52.080	1	B	Good 1996			
A 456	AM0188	Bay City	55.80	55.860	1	B	Good 1972			
G 761	AM0189	Bay City	47.70	47.770	1	C	Good 1972			
M 581	AM0190	Bay City	47.20	47.360	1	C	Good 1972			
F 1206	AM0191	Bay City	44.90	45.050	1	C	Good 1972			
G 51 Reset	AM0192	Bay City	44.60	44.740	1	C	Good 1972	Reset 1941		
Y 455	AM0195	Bay City	37.60	37.710	1	C	Not Found 1998			
X 455	AM0196	Bay City	37.90	37.950	1	C	Not Found 1998			
T 455	AM0197	Bay City	38.40	38.450	1	C	Not Found 1998			
D 571	AM0198	Bay City	39.20	39.350	1	C	Not Found 1998			
E 571 Reset	AM0199	Bay City	39.60	39.700	3	C	Not Found 1998	Reset 1960		
B 580	AM0204	Bay City	57.80	57.930	2	B	Not Found 2004			
C 580	AM0205	Bay City	50.20	50.280	1	B	Not Found 2004			
A 585	AM0206	Wadsworth	28.50	28.680	1	C	Good 1951			
B 585	AM0207	Lake Austin	24.40	24.51	2	C	Good 1941			
Poole RM	AM0209	Lake Austin	12.40	12.550	2	C	Good 1942			
Poole	AM0210	Lake Austin	16.20	16.310	2	C	Good 1969			
Poole RM1	AM0211	Lake Austin	14.90	15.040	2	C	Good 1942			
E 585	AM0213	Lake Austin	10.40	10.520	2	C	Good 1941			
F 585	AM0214	Lake Austin	4.70	4.840	2	C	Good 1941			
G 585	AM0215	Lake Austin	2.80	2.910	2	C	Good 1941			
H 585	AM0216	Lake Austin	3.10	3.270	2	C	Good 1941			
Irene	AM0217	Dressing Point	3.10	3.300	2	C	Good 1969			
Irene RM1	AM0218	Dressing Point	1.10	1.230	2	C	Good 1934			
Irene RM2	AM0219	Dressing Point	2.20	2.330	2	C	Good 1934			
P 573	AM0235	Cedar Lane	15.5	15.54	2	C	Not Found 2003			
N 573	AM0236	Cedar Lane	4.92	4.955	2	C	Not Found 2003			
M 573	AM0237	Cedar Lane	4.49	4.523	2	C	Not Found 2003			
X 573	AM0248	Cedar Lane	6.58	6.605	2	C	Not Found 2003			
F 573	AM0250	Cedar Lane	7.78	7.814	2	C	Not Found 2003			
S 581	AM0266	Wadsworth	5.83	5.879	2	C	Good 1960			
2209 TXRD	AM0270	Wadsworth	6.32	6.37	1	C	Good 1943			
F 761	AM0297	Bay City	51.0	51.07	1	C	Good 1942			
C 571	AM0322	Bay City	41.0	41.11	1	C	Not Found 1998			
F 571 Reset 1960	AM0326	Bay City NE	42.1	42.2	3	C	Not Found 1998	Reset 1960		
H 571 Reset 1960	AM0329	Bay City NE	32.4	32.5	3	C	Good 1998			
K 571 Reset 1960	AM0332	Bay City NE	32.8	32.9	3	C	Good 1998			
L 571 Reset 1960	AM0334	Bay City NE	33.3	33.4	3	C	Not Found 1998			
M 571	AM0335	Bay City NE	30.6	30.7	2	C	Not Found 1998			
P 571 Reset 1960	AM0338	Bay City NE	24.4	24.5	3	C	Good 1998			
Estill RM2	AM0339	Cedar Lane	31.5	31.61	2	C	Good 1996			
Estill 2	AM0340	Cedar Lane	30.0	30.1	HOR 2	C	Not Found 2003			
Estill 2 RM3	AM0341	Cedar Lane	29.7	29.8	2	C	Good 1996			
Estill RM1	AM0342	Cedar Lane	27.1	27.23	3	C	Not Found 2003			
Q 571 Reset 1960	AM0346	Cedar Lane	21.8	21.9	2	C	Not Found 1991			
R 571	AM0347	Cedar Lane	20.6	20.67	3	C	Good 1996			
S 571 Reset 1961	AM0349	Cedar Lane	17.6	17.7	3	C	Not Found 1996			
T 571 Reset 1961	AM0351	Cedar Lane	20.5	20.6	3	C	Not Found 1996			
U 571 Reset 1961	AM0353	Cedar Lane	15.2	15.3	3	C	Good 1961			
V 571	AM0354	Cedar Lane	18.1	18.22	2	C	Not Found 1996			
W 571 Reset 1961	AM0356	Cedar Lane	12.2	12.3	3	C	Poor 1991			
X 571 Reset 1961	AM0358	Sargent	12.5	12.6	3	C	Not Found 1991			
Y 571 Reset 1961	AM0360	Sargent	11.2	11.3	3	C	Not Found 2003			
A 572	AM0362	Sargent	10.7	10.78	2	C	Not Found 2003			
B 572	AM0363	Sargent	7.0	7.13	2	C	Not Found 2003			
C 572	AM0364	Sargent	6.5	6.61	2	C	Not Found 2003			
PIERCE	AM0365	Sargent	7.7	7.82	2	C	Not Found 1991			

Matagorda County Bench Marks

Designation	PID	USGS Quad	NAVD 1988	NGVD 1929	Vertical Order	Stability	Recovery Status and Date	Remarks	Nearest Stream	Nearest Roadway
PIERCE RM3	AM0367	Sargent	6.0	6.2	3	C	Not Found 1991			
PIERCE RM1	AM0368	Sargent	5.9	6.06	2	C	Not Found 1991			
D 572	AM0369	Sargent	3.4	3.54	2	C	Not Found 1991			
E 572	AM0370	Sargent	4.1	4.24	2	C	Good 1941			
AERMOTOR	AM0373	Cedar Lane W	2.8	2.9	2	C	Not Found 1969			
AERMOTOR RM1	AM0374	Cedar Lane W	4.6	4.7	2	C	Not Found 1952			
AERMOTOR RM2	AM0375	Cedar Lane W	2.5	2.6	2	C	Good 1942			
K 572	AM0378	Wadsworth	26.5	26.64	1	C	Not Found 1998			
L 572	AM0379	Wadsworth	27.0	27.15	1	C	Not Found 1998			
M 572 Reset 1951	AM0381	Lake Austin	17.4	17.53	1	C	Good 1951			
N 572 Reset 1951	AM0383	Lake Austin	19.9	20.06	1	C	Good 1951			
P 572 Reset 1951	AM0385	Lake Austin	13.0	13.10	1	B	Good 1951			
Q 572	AM0386	Lake Austin	14.4	14.55	1	C	Good 1951			
R 572	AM0387	Lake Austin	15.3	15.40	2	C	Good 1941			
S 572	AM0388	Lake Austin	26.0	26.07	2	C	Good 1941			
T 572	AM0389	Bay City NE	32.7	32.84	2	C	Not Found 1996			
U 572	AM0390	Bay City NE	21.9	22.02	2	C	Not Found 1996			
V 572	AM0391	Bay City NE	18.4	18.54	2	C	Not Found 1996			
A 573	AM0392	Bay City NE	18.1	18.23	2	C	Not Found 1996			
B 573	AM0393	Bay City NE	18.3	18.46	2	C	Not Found 1996			
C 573	AM0395	Bay City NE	17.8	17.88	2	C	Not Found 1996			
D 573	AM0396	Cedar Lane	18.2	18.33	2	C	Not Found 1998			
E 573	AM0397	Cedar Lane	18.8	18.85	2	C	Not Found 1998			
DAVIES	AM0467	Cedar Lane W	14	14	HOR 2	C	Good 1978			
TT 15 USGS	AM0469	Cedar Lane W	16	16	HOR 2	C	Good 1978			
SMITH	AM0470	Cedar Lane W	14	14	HOR 2	C	Good 1982			
SMITH AZ MK	AM0472	Cedar Lane W	3	3	HOR 2	C	Good 1978			
TRAP 1934 RM2	AM0474				HOR 2	C		No longer in database		
DAVIES AZ MK	AM0475	Cedar Lane W	15	15	HOR 2	C	Good 1978			
Pierce 1931 MK2	AM0480	Sargent	7	7	HOR 2	C	Not Found 2003			
Prairie 1852 RM1	AM0484				HOR 2	C		No longer in database		
MARIE 2	AM0488	Brown Cedar Cut	7	7	HOR 2	C	Good 1978			
MARIE 2 AZ	AM0489	Brown Cedar Cut	10	10	2	C	Good 1978	Marie 2 AZ Mark		
Seven Mile	AM0491	Dressing Point	7		3	C	Not Found 2006			
East Point	AM0500	Dressing Point	9	10	2	C	Good 1978	East Point 1883 AZ Mark		
West Point	AM0501	Dressing Point	8	8	2	C	Good 1978	West Point 1883 AZ Mark		
ROW 2 AZ	AM0504	Dressing Point	11	11	2	C	Good 1978	ROW AZ Mark		
ROW 2	AM0506	Dressing Point	10	11	2	C	Good 1978			
E 12+00 USE	AM0508	Matagorda SW	12	13	2	C	Good 1978			
IDOL 2 AZ	AM0510	Matagorda SW	9	9	2	B	Good 1991	Idol 2 AZ Mark		
E 5 USE	AM0513	Matagorda SW	8	9	2	C	Good 1978			
H 82 TX	AM0514	Matagorda SW	11	11	3	C	Good 1991			
Crab RM2	AM0524				2	C	Crab 1934 RM 2	No longer in database		
Cityport	AM0539	Bay City NE	43.0	43	HOR 0	B	Good 2008			
Cityport AZ	AM0540	Bay City NE	42.9	43	HOR 0	B	Good 2008	Cityport AZ Mark		

Matagorda County Bench Marks

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AN Series										
W 41	AN0024	Francitas	27.0	27.15	1	C	Good 1991			
K 761	AN0025	Francitas	29.3	29.45	1	B	Not Found 1991			
X 41	AN0026	Francitas	30.1	30.22	1	C	Good 1991			
F 1207	AN0029	Blessing	36.7	36.9	1	C	Good 1991			
C 1206	AN0030	Blessing	37.2	37.36	1	B	Good 1978			
A 51	AN0032	Blessing	43.2	43.36	1	B	Good 2006			
Z 41	AN0033	Blessing	43.0	43.15	1	B	Not Found 2006			
G 1207	AN0036	Blessing	40.0	40.16	1	B	Not Found 2006			
L 456	AN0038	Blessing	35.5	35.69	1	C	Not Found 1959			
E 583	AN0039	Blessing	40.5	40.62	1	B	Good 2006			
D 456	AN0040	Blessing	39.8	39.96	1	B	Not Found 1978			
N 761	AN0043	Midfield	35.3	35.48	1	B	Good 1991			
B 51	AN0044	Midfield	27.4	27.54	1	B	Good 1991			
J 1207	AN0045	Midfield	32.2	32.3	1	C	Good 1991			
P 761	AN0046	Midfield	34.1	34.27	1	C	Not Found 1978			
D 1206	AN0047	Midfield	32.5	32.68	1	C	Good 1991			
L 1207	AN0049	Midfield	40.3	40.39	1	B	Good 1991			
C 51 Reset	AN0050	Midfield	39.8	39.9	1	C	Not Found 1978	Reset 1942		
R 761	AN0051	Markham	37.0	37.17	1	C	Not Found 1978			
K 1207	AN0052	Markham	36.2	36.35	1	C	Good 1978			
S 761	AN0053	Markham	36.1	36.25	1	C	Good 1978			
D 51	AN0054	Markham	36.5	36.6	1	C	Good 1942			
D 51 Reset	AN0055	Markham	36.8	36.97	1	C	Good 1978	Reset 1951		
T 761	AN0056	Markham	35.6	35.72	1	C	Good 1978			
M 1207	AN0057	Markham	40.4	40.51	1	C	Good 1978			
U 761	AN0058	Markham	37.8	37.92	1	C	Not Found 1978			
E 1206	AN0059	Markham	41.0	41.18	1	C	Good 1999			
E 51	AN0060	Markham	41.8	41.92	1	C	Poor 1999			
B 762	AN0061	Markham	38.1	38.2	1	C	Poor 1991			
F 51 Reset	AN0062	Markham	47.2	47.32	1	B	Good 1978	Reset 1937		
N 1206	AN0064	Markham	42.1	42.24	1	C	Good 1978			
Z 761	AN0066	Markham	41.9	41.96	1	C	Good 1978			
C 584	AN0161	Turtle Bay	9.8	10.04	2	C	Good 1941			
D 584 Reset	AN0163	Turtle Bay	9.5	9.7	3	C	Good 1963	Reset 1963		
E 584	AN0164	Turtle Bay	8.7	8.9	2	C	Good 1941			
E 584 Reset	AN0165	Turtle Bay	8.8	9.0	3	C	Good 1963			
School	AN0169	Turtle Bay	13.3	13.5	2	C	Good 1947			
School RM1	AN0170	Turtle Bay	12.9	13.19	2	C	Good 1934			
School RM2	AN0171	Turtle Bay	13.2	13.41	2	C	Good 1934			
L 584 Reset	AN0175	Turtle Bay	14.5	14.8	3	C	Good 1963	Reset 1963		
F 583	AN0183	Blessing	36.7	36.9	2	B	Good 1951			
Palacios NB RM1	AN0186	Blessing	34.2	34.32	1	C	Not Found 1991	Palacios NB RM1		
Palacios NB	AN0187	Blessing	31.1	31.31	1	C	Good 2004	Palacios North Base		
H 583	AN0188	Blessing	30.7	30.9	2	C	Good 1941			
H 583 Reset	AN0189	Blessing	30.7	30.8	3	C	Not Found 1991	Reset 1963		
J 583 Reset	AN0191	Blessing	29.1	29.2	3	C	Not Found 1991	Reset 1963		
K 583 Reset	AN0193	Blessing	27.2	27.4	3	C	Good 1991	Reset 1963		
L 583 Reset	AN0195	Blessing	27.2	27.4	3	C	Good 1991	Reset 1963		
M 583 Reset	AN0197	Blessing	26.1	26.2	3	C	Good 1991	Reset 1963		
N 583	AN0198	Blessing	26.0	26.19	2	C	Good 1941			
Tangent 2	AN0199	Blessing	25.1	25.3	HOR 3	C	Not Found 1991			
Tangent	AN0200	Blessing	24.5	24.72	2	C	Not Found 1991			
Tangent RM1	AN0201	Blessing	24.0	24.25	2	C	Not Found 1991			
Tangent RM2	AN0202	Blessing	24.7	24.89	2	C	Good 1934			
P 583 Reset	AN0204	Blessing	22.8	23.0	3	C	Good 1991	Reset 1963		
Q 583	AN0205	Blessing	16.2	16.4	2	B	Good 1941			
Q 583 Reset	AN0206	Blessing	15.2	15.4	3	C	Good 1963	Reset 1963		
R 583 Reset	AN0208	Blessing	20.0	20.2	3	C	Good 1991	Reset 1963		

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Rail	AN0209	Palacios	17.6	17.83	2	C	Poor 1991			
Rail RM 1	AN0210	Palacios	17.7	17.91	2	C	Not Found 1991			
Rail RM 2	AN0211	Palacios	17.9	18.11	2	C	Good 1969			
Rail RM 3	AN0212	Palacios	17.7	17.9	3	C	Good 1941			
Palacios SB	AN0218	Palacios	14.8	15.07	2	C	Good 1973	Palacios South Base		
Palacios SB RM1	AN0219	Palacios	14.6	14.87	2	C	Good 1973	Palacios SB RM1		
Camp Hulen RM1	AN0221	Palacios	8.3	8.54	2	C	Not Found 1991			
Camp Hulen RM3	AN0222	Palacios	9.9	10.19	2	C	Not Found 1978			
T 576	AN0237	Markham	45.5	45.56	2	C	Not Found 1991			
A 581	AN0241	Markham	41.3	41.41	1	C	Not Found 1991			
B 581	AN0242	Blessing SE	35.3	35.46	2	C	Not Found 1991			
C 581	AN0243	Blessing SE	39.2	39.39	2	C	Not Found 1991			
D 581	AN0244	Blessing SE	40.8	40.91	2	C	Not Found 1991			
E 581	AN0245	Blessing SE	37.5	37.64	2	C	Good 1941			
G 581	AN0247	Blessing SE	35.4	35.59	2	C	Not Found 1991			
U 579	AN0250	Markham	51.5	51.59	2	C	Not Found 1991			
W 579	AN0252	Markham	50.9	51.0	2	C	Not Found 1991			
X 579	AN0253	Markham	52.0	52.08	2	B	Not Found 1991			
Y 579	AN0254	Markham	50.0	50.11	2	C	Not Found 1991			
A 580	AN0256	Markham	53.0	53.10	2	C	Not Found 2004			
X 581 Reset	AN0261	Blessing SE	21.6	21.8	3	C	Not Found 1991	Reset 1960		
B 582 Reset	AN0265	Blessing SE	21.3	21.5	3	C	Not Found 1991	Reset 1960		
L 581 Reset	AN0270	Blessing SE	26.3	26.5	3	C	Not Found 1991	Reset 1960		
P 581	AN0271	Blessing SE	25.9	26.05	2	C	Not Found 1991			
R 581	AN0273	Blessing SE	19.3	19.41	2	C	Not Found 1991			
G 582	AN0276	Palacios	17.7	17.95	2	C	Not Found 1991			
H 582	AN0277	Palacios	16.5	16.72	2	C	Good 1996			
J 582	AN0278	Palacios	12.3	12.54	2	C	Not Found 1991			
K 582	AN0279	Palacios	12.8	13.03	2	C	Not Found 1991			
L 582	AN0280	Palacios	18.6	18.83	2	B	Not Found 1991			
M 582	AN0281	Palacios	7.4	7.61	2	C	Not Found 1996			
N 582	AN0282	Palacios	13.7	13.88	2	C	Not Found 1996			
P 582	AN0283	Palacios	17.4	17.58	2	C	Good 1996			
W 582	AN0284	Palacios	14.5	14.72	2	C	Poor 1996			
Mott RM	AN0286	Palacios	7.4	7.62	2	C	Good 1941			
Q 582	AN0287	Palacios	14.9	15.09	2	C	Not Found 1996			
R 582	AN0288	Palacios	15.5	15.74	2	C	Good 1941			
S 582	AN0289	Palacios	12.5	12.71	2	C	Good 1941			
T 582	AN0290	Palacios	10.6	10.81	2	C	Good 1941			
U 582	AN0291	Palacios	5.4	5.65	2	C	Good 1941			
D 583	AN0292	Palacios Point	4.7	4.96	2	C	Good 1941			
C 583	AN0293	Palacios Point	4.4	4.67	2	C	Good 1941			
X 583	AN0294	Palacios NE	22.7	22.93	2	C	Good 1941			
Y 583	AN0295	Palacios NE	20.8	21.02	2	C	Good 1941			
Z 583	AN0296	Palacios NE	22.2	22.39	2	C	Good 1941			
A 583	AN0297	Palacios NE	15.4	15.54	2	C	Good 1941			
B 583	AN0298	Palacios NE	15.8	15.99	2	C	Good 1941			
Chiseled Square	AN0299	Palacios NE	19.1	19.30	2	B	Good 1942	Chiseled Square		
T 575	AN0305	Midfield	51.6	51.73	2	C	Not Found 1999			
F 577	AN0306	Midfield	51.8	51.9	2	B	Not Found 1999			
U 575	AN0308	Midfield	53.9	53.99	2	C	Not Found 1999			
Y 575	AN0315	Midfield	45.2	45.33	2	C	Not Found 1991			
Z 575	AN0316	Midfield	44.5	44.58	2	C	Not Found 1978			
A 576	AN0317	Midfield	42.3	42.43	2	C	Not Found 1978			
D 577	AN0318	Midfield	57.2	57.27	2	C	Not Found 1999			
A 577	AN0321	Midfield	55.2	55.34	2	C	Not Found 1999			
Clapper RM1	AN2203	Blessing SE	41.2	41.3	HOR 2	C	Good 1976			
Clapper 2 RM6	AN2205	Blessing SE	39.2	39.3	HOR 2	C	Good 1976			
Cavallo 2 AZ MK	AN2267	Decros Point	14	14	HOR 2	C	Good 1978			
Palaport	AN2401	Turtle Bay	12.2	13	HOR 0	B	Good 2008			
Palaport AZ MK	AN2402	Palacios	12.7	14	HOR 0	B	Good 2008			
Erod	AN2421	Palacios Point	4	4	HOR 2	B	Good 1991			

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AW Series										
J1206	AW1206	Ashwood	32.4	32.49	1	B	Good 1990			
X754	AW1207	Ashwood	32.7	32.81	1	C	Good 1990			
B52 Reset 1951	AW 1208	Ashwood	33.7	33.8	3	C	Good 1989	Reset 1951		
Y 754	AW 1209	Ashwood	33.9	33.98	1	C	Good 1978			
Z 754	AW 1210	Ashwood	36.3	36.32	1	C	Good 1989			
H 755	AW1212	Ashwood	39.3	39.37	1	C	Good 1978			
J 755	AW1213	Van Vleck	39.1	39.15	1	C	Good 1996			
H 1206	AW1214	Van Vleck	35.9	36.01	1	C	Good 1996			
J 757	AW1215	Van Vleck	42.2	42.28	1	C	Not Found 1996			
Van Vleck	AW1216	Van Vleck	44.8	44.93	1	C	Not Found 1996			
Van Vleck RM2	AW1217	Van Vleck	44.9	44.96	1	C	Not Found 1996			
Van Vleck RM1	AW1251	Van Vleck	45.0	45.1	2	C	Not Found 2004			
K 757	AW 4280	Van Vleck	44.5	44.6	2	C	Not Found 2004			
L 757	AW 4281	Van Vleck			2	C	Not Found 2004			
M 757	AW 4282	Ashwood			2	C	Not Found 2004			
N 757	AW 4283	Ashwood			2	C	Not Found 2004			
P 757	AW 4284	Ashwood			2	C	Not Found 2004			
T 757	AW 4288	Ashwood			2	C	Not Found 2004			
U 757	AW 4289	Van Vleck			2	C	Not Found 2004			
A 758	AW 4292	Pledger			2	C	Not Found 2004			
Pledger AZ	AW 4295	Pledger			2	C	Not Found 2004			
Pledger	AW 4296	Pledger			2	C	Not Found 2004			
Pledger RM1	AW 4297	Pledger	20.56	20.569	2	C	Good 2004			
Pledger RM2	AW 4298	Pledger	20.30	20.311	2	C	Good 2004			
E 756	AW 4329				2	C				
H 801	AW 4371				2	C				
J 801	AW 4372	Pledger	18.11	18.122	2	C	Good 1999			
J 801 Reset	AW 4373	Pledger	18.15	18.16	3	C	Good 2004	Reset 1961		
K 801	AW 4374	Danciger	18.18	18.191	2	C	Good 2004			
L 801	AW 4375	Danciger	16.60	16.606	2	C	Not Found 1999			
L 801 Reset	AW 4376	Danciger	16.60	16.61	3	C	Not Found 2004			
M 801	AW 4377	Danciger	15.80	15.815	2	C	Not Found 1999			
M 801 Reset	AW 4378	Danciger	15.64	15.65	3	C	Good 2004			
N 801	AW 4379	Danciger	15.42	15.434	2	C	Not Found 2004			
B 756	AW 4426	Ashwood	9.46	9.48	1	C	Good 1951			
C 756	AW 4427	Ashwood	10.31	10.33	2	C	Not Found 1998			
D 756	AW 4428	Ashwood	9.86	9.88	2	C	Not Found 1998			
P 213	AW 4445	Pledger	21.67	21.686	2	C	Good 1942			
4 D 69.8	AW 4446	Pledger	21.22	21.231	2	B	Good 1942			
Q 213	AW 4448	Van Vleck	19.91	19.93	2	C	Not Found 1996			
R 213	AW 4450	Van Vleck	18.94	18.95	2	C	Not Found 1996			
G 631	AW 4451	Van Vleck	18.18	18.20	2	C	Not Found 1996			
S 213	AW 4452	Van Vleck	17.86	17.88	2	C	Good 1942			
F 631	AW 4454				2	C				
T 213	AW 4455	Van Vleck	16.56	16.59	2	C	Good 1942			

Matagorda County Bench Marks

Designation	PID	USGS Quad	NAVD 1988	NGVD 1929	Vertical Order	Stability	Recovery Status and Date	Remarks	Nearest Stream	Nearest Roadway
AX Series										
W 574	AX0518	Lane City SE	22.99	23.003	2	C	Good 1943			
X 574	AX0520	Lane City SE	22.46	22.476	2	C	Good 1943			
Y 574	AX0521	Lane City SE	21.93	21.953	2	C	Good 1943			
Z 574	AX0522	Lane City SE	21.54	21.563	2	C	Good 1943			
C 576 Reset	AX0524	Lane City SE	21.08	21.10	3	C	Good 1971	Reset 1971		
D 576 Reset	AX0526	Lane City SE	20.74	20.76	3	C	Good 1971	Reset 1971		
E 576 Reset	AX0528	Lane City SE	20.19	20.21	3	C	Not Found 1990	Reset 1971		
F 576	AX0529	Lane City SE	19.21	19.23	2	C	Good 1971			
H 576 Reset	AX2463				3	C		Reset 1971		

Matagorda County BM Summary

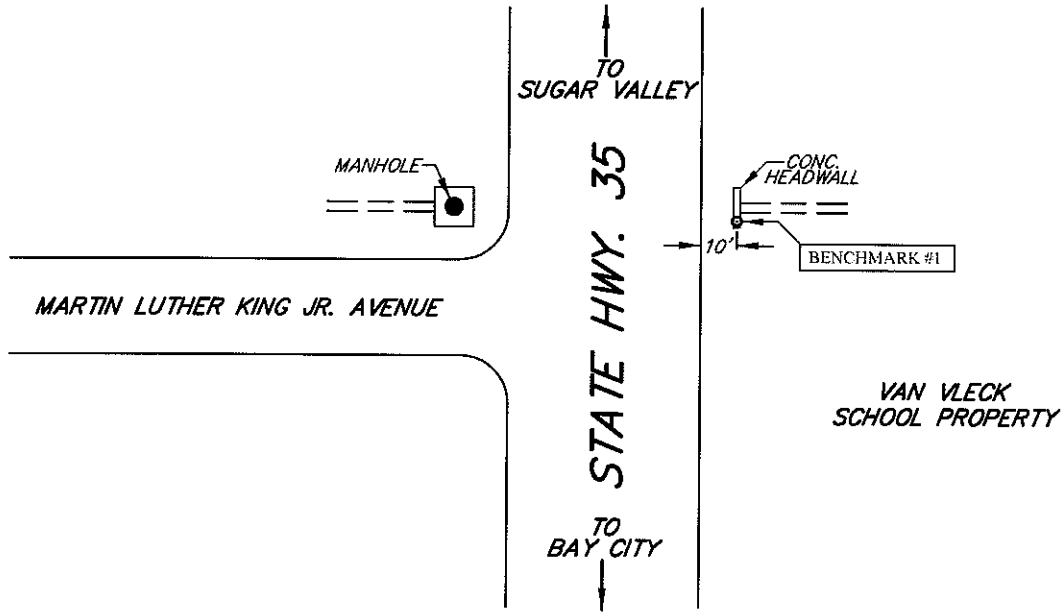
	Vertical BM's	Horizontal BM's	Total BM's	Vertical BM's Not Found	Usuable BM's
AC Series	0	2	2		0
AH Series	0	1	1		0
AI Series	1	0	1		1
AM Series	152	17	169	70	82
AN Series	113	7	120	49	64
AW Series	45	0	45	23	22
AX Series	9	0	9	1	8
Total	320	27	347	143	177

Land Area	1114.46	square miles(SM)
Usuable BM's	177	Total NAVD 1988 BM's
BM's per SM	0.16	
SM per BM	6.30	

LCRA HARN Network in Matagorda County

OBJECTID	GPS_ID	DESC_	NORTH_F_	EAST_F_	N88_EL_F_	N29_EL_F_	LATITUDE	LONGITUDE	ELLIPS_F_	GSEP_03_F_	CONV	SCALE_FCT	COUNTY	TOPO_NAME	Shape
128	A078	1/2" IRON ROD W/ALUMINUM CAP	9598847.9	3650618	43.85	43.96	28°55'33.83721"	-96°06'07.13335"	-44.53	-88.38	2°10'45.82'	1.00053002	MATAGORDA	MARKHAM	128
129	A079	1/2" IRON ROD W/ALUMINUM CAP	9620662.5	3683426	53.42	53.51	28°58'57.03492"	-95°59'48.85305"	-34.83	-88.25	2°14'00.66'	1.00049534	MATAGORDA	BAY CITY	129
130	A080	1/2" IRON ROD W/ALUMINUM CAP	9586587.5	3653561	39.7	39.82	28°53'31.50111"	-96°05'39.30899"	-48.54	-88.23	2°11'00.15'	1.00055136	MATAGORDA	MARKHAM	130
145	A097	1/2" IRON ROD W/ALUMINUM CAP	9619340.2	3715163	40.4	40.49	28°58'31.58219"	-95°53'52.56372"	-47.54	-87.94	2°17'04.17'	1.00049963	MATAGORDA	BAY CITY	145
146	A099	1/2" IRON ROD W/ALUMINUM CAP	9654793.1	3696211	59.91	59.97	29°04'29.55581"	-95°57'09.96324"	-28.56	-88.47	2°15'22.50'	1.00044063	MATAGORDA	VAN VLECK	146
321	A385	3" LCRA ALUMINUM DISC IN CONC STAM	9616263.1	3651654	58.25	58.35	28°58'25.64588"	-96°05'48.03369"	-30.29	-88.54	2°10'55.66'	1.00050064	MATAGORDA	MARKHAM	321
322	A386	NGS BRASS DISC IN CONCRETE HEADWAL	9623676.5	3635545	56.69	56.78	28°59'44.98438"	-96°08'46.03312"	-32.09	-88.78	2°09'23.98'	1.0004873	MATAGORDA	MIDFIELD	322
485	A588	3" LCRA ALUMINUM DISC IN CONC STAM	9562461.9	3706121	30.85	30.99	28°49'12.77861"	-95°55'59.54435"	-56.74	-87.58	2°15'58.77'	1.00059762	MATAGORDA	WADSWORTH	485
486	A589	3" LCRA ALUMINUM DISC IN CONC STAM	9549495.1	3676177	22.27	22.43	28°47'16.16850"	-96°01'41.34997"	-65.51	-87.77	2°13'02.72'	1.00061897	MATAGORDA	BLESSING SE	486
758	A909	3" LCRA ALUMINUM DISC IN CONC (NOT	9549863	3686268	21.03	21.19	28°47'15.92859"	-95°59'47.93912"	-66.66	-87.69	2°14'01.13'	1.00061901	MATAGORDA	WADSWORTH	758
782	A939	3" ALUM ALUMINUM DISC IN CONC STAM	9518269.6	3694738	14.25	14.44	28°42'00.30653"	-95°58'26.78587"	-73.14	-87.39	2°14'42.93'	1.00067836	MATAGORDA	MATAGORDA	782
914	AZA1	5/8" IRON ROD W/ALUMINUM CAP STAMP	9616124.8	3648936	52.1	52.19	28°58'25.30137"	-96°06'18.65217"	-36.48	-88.57	2°10'39.89'	1.0005007	MATAGORDA	MARKHAM	914
915	AZA2	5/8" IRON ROD W/ALUMINUM CAP STAMP	9623574.9	3633683	56.65	56.73	28°59'44.67316"	-96°09'07.01977"	-32.15	-88.8	2°09'13.17'	1.00048735	MATAGORDA	MIDFIELD	915
1028	CLAP	NGS BRASS DISC IN CONC STAMPED CLA	9571439.5	3661035	39.73	39.87	28°50'58.90122"	-96°04'21.85966"	-48.31	-88.03	2°11'40.05'	1.00057846	MATAGORDA	BLESSING SE	1028
1029	CLAZ	NGS BRASS DISC IN CONC STAMPED CLA	9571019.6	3660364	38.6	38.74	28°50'55.00418"	-96°04'29.57133"	-49.44	-88.03	2°11'36.07'	1.00057916	MATAGORDA	BLESSING SE	1029
1148	D584	NGS BRASS DISC MONUMENT STAMPED D	9522081	3604122	9.48	9.72	28°43'11.97797"	-96°15'21.37788"	-78.61	-88.09	2°06'00.35'	1.00066469	MATAGORDA	TURTLE BAY	1148
1201	H582	NGS BRASS DISC IN CONC STAMPED H58	9528158	3645168	15.11	15.31	28°43'56.94502"	-96°07'38.44098"	-72.79	-87.9	2°09'58.79'	1.00065616	MATAGORDA	PALACIOS	1201
1219	IDL2	NGS TRI STA. IDOL 2 1978 PID# AM05	9481230.5	3695138	7.4	7.61	28°35'53.98546"	-95°58'38.56959"	-79.5	-86.9	2°14'36.86'	1.00075011	MATAGORDA	MATAGORDA SW	1219
1221	J801	NGS BRASS DISC IN 16"X6" CONC FTG.	9701794.3	3715127	59.35	59.38	29°12'06.88374"	-95°53'15.90285"	-29.42	-88.77	2°17'23.05'	1.00036954	MATAGORDA	PLEDGER	1221
1328	LCBC	LCRA Coop CORS	9621218.7	3694084	112.76	112.86	28°58'58.40851"	-95°57'48.75607"	24.61	-88.15	2°15'02.52'	1.00049511	MATAGORDA	BAY CITY	1328
1364	MA02	5/8" LCRA IRON ROD IN CONC STAMPED	9619243.8	3678455	49.22	49.31	28°58'44.92041"	-96°00'45.36812"	-39.07	-88.29	2°13'31.55'	1.00049738	MATAGORDA	MARKHAM	1364
1365	MA68	60D NAIL	9609320.3	3663471	50.03	50.13	28°57'12.52574"	-96°03'38.15512"	-38.32	-88.35	2°12'02.56'	1.00051306	MATAGORDA	MARKHAM	1365
1367	MALS	NGS BRASS DISC TRI STA STAMPED LON	9515917.8	3696491	10.83	11.01	28°41'36.37689"	-95°58'08.17118"	-76.52	-87.35	2°14'52.52'	1.00068296	MATAGORDA	MATAGORDA	1367
1406	PANB	NGS 3" BRASS DISC IN CONC STAMPED	9568792.7	3614553	30.97	31.13	28°50'50.04183"	-96°13'04.98973"	-57.44	-88.41	2°07'10.60'	1.00058005	MATAGORDA	BLESSING	1406
1441	STMY	NGS BRASS DISC IN CONC STAMPED STE	9605666.1	3716884	35.92	36.02	28°56'15.70408"	-95°53'39.35548"	-51.89	-87.81	2°17'10.97'	1.0005228	MATAGORDA	BAY CITY	1441
1483	VANV	NGS BRASS DISC TRI-STA. VAN VLECK	9634432.2	3716718	44.86	44.94	29°01'00.18818"	-95°53'28.29478"	-43.2	-88.07	2°17'16.67'	1.00047478	MATAGORDA	VAN VLECK	1483
1484	VAR2	**DESTROYED**	9634508.8	3716631	44.98	45.06	29°01'00.98074"	-95°53'29.24283"	-43.09	-88.07	2°17'16.18'	1.00047465	MATAGORDA	VAN VLECK	1484
1487	W125	NGS BRASS DISC IN CONC STAMPED W12	9523367.8	3700612	6.43	6.61	28°42'48.42631"	-95°57'18.67051"	-80.94	-87.37	2°15'18.01'	1.00066917	MATAGORDA	MATAGORDA	1487
1537	WS25	3" LCRA ALUMINUM DISC IN CONC STAM	9621383.9	3701331	47.78	47.87	28°58'57.21788"	-95°56'27.18283"	-40.3	-88.08	2°15'44.53'	1.00049531	MATAGORDA	BAY CITY	1537
1547	WS35	3" LCRA ALUMINUM DISC IN CONC STAM	9519888	3607986	11.95	12.18	28°42'48.89282"	-96°14'38.94055"	-76.1	-88.05	2°06'22.21'	1.00066908	MATAGORDA	PALACIOS	1547
1552	WS40	3" LCRA ALUMINUM DISC IN CONC STAM	9701657.1	3714630	58.24	58.27	29°12'05.72356"	-95°53'21.55998"	-30.54	-88.78	2°17'20.14'	1.00036972	MATAGORDA	PLEDGER	1552

LCRA Bench Mark Data is available on line: www.lcra.org



SCALE: N.T.S.

M.C.D.D. NO. 1 BENCHMARK NO. 1

General Location:

Benchmark M.C.D.D. No. 1 BM No. 2 is located in Van Vleck, Matagorda County, Texas. 0.2 miles Northeast of intersection of State Highway 35 and F.M. Highway 2540 in Van Vleck. Mark is on the Southeast side of Highway 35, opposite the intersection of Highway 35 and Martin Luther King Jr. Avenue (1st Street). 10 feet Southeast of the back of curb. Mark is in the top of the Southwest end of a single culvert headwall. Marked "M.C.D.D. No. 1 B.M. No. 1".

Horizontal Datum: NAD-83.

Vertical Datum: NAVD-88.

Grid:

X= 2,963,203.00 U.S. Ft.

Y= 13,568,077.85 U.S. Ft.

Elevation: 42.70'

Latitude: N 29° 01' 12.276"

Longitude: W 95° 53' 13.565"

Datum: WGS-84

Type of Monument: Brass disk marked "M.C.D.D. No. 1 BM No. 1" - Set (5/11/09).

Horizontal & Vertical data derived by GPS observations on 5/12/09 processed with a precise ephemeris and Geoid 03 using a constrained network of NGS monuments R757 and L576 for vertical reference and NGS monument CITYPORT for horizontal and vertical reference.

CHARLIE KALKOMEY Surveying, Inc. Land Surveyors
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a Jones & Carter Company
Austin * Brenham * Bryan * Dallas * Houston
Rosenberg * San Antonio * The Woodlands

SURVEYOR-C.D.K./DRAFTSMAN-BA.H. JOB No. R0003-004-00

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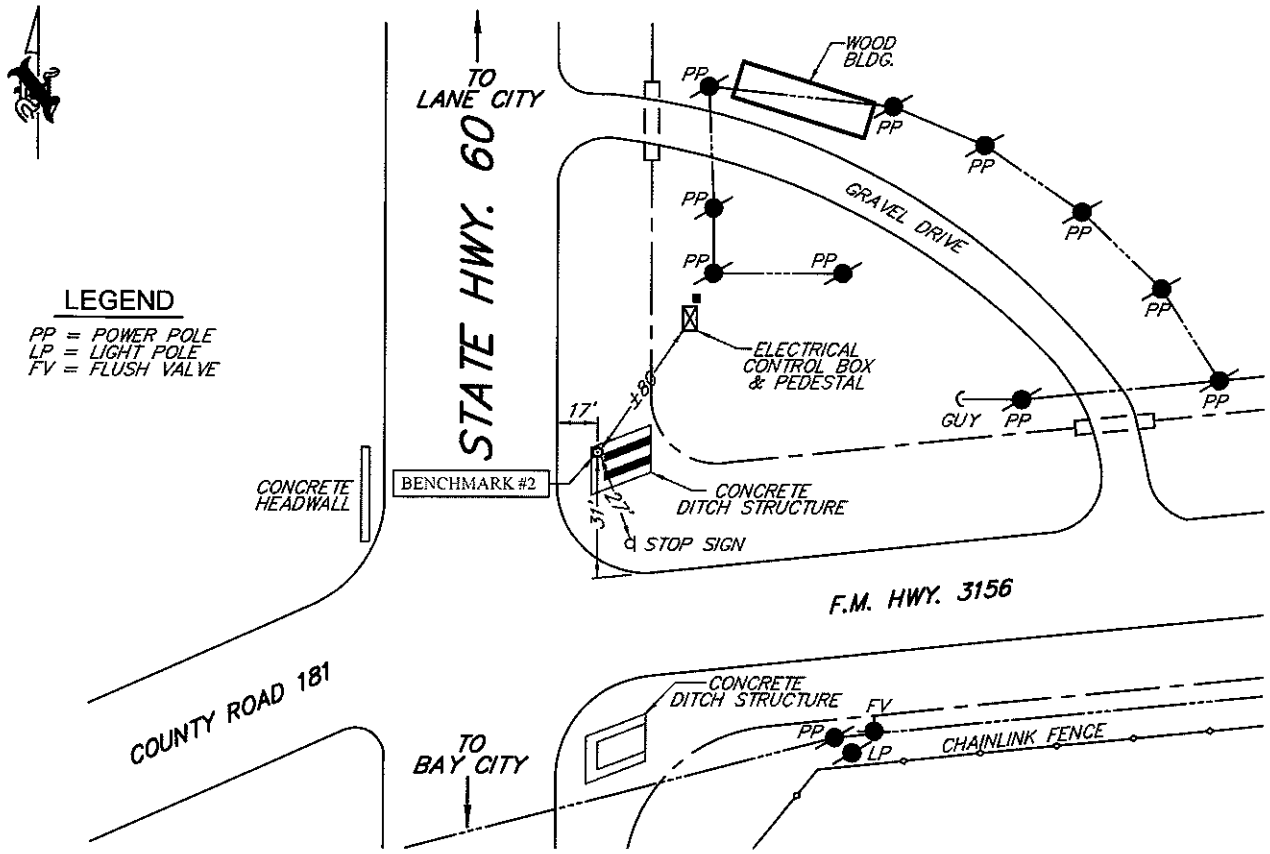

SCALE: N.T.S.

M.C.D.D. NO. 1 BENCHMARK NO. 2

General Location:

Benchmark M.C.D.D. No. 1 BM No. 2 is located in Bay City, Texas, approximately 2.3 miles North of the center of Bay City. From intersection of State Highway 60 and State Highway 35, proceed North along State Highway 60 2.28 miles to the intersection of State Highway 60 and F.M. Highway 3156. Mark is at the Northeast quadrant of the intersection. Mark is in the top of the Northwest end of a double headed culvert headwall. 17 feet East of the edge of State Highway 60 road surface. 31 feet North of the edge of F.M. Highway 3156 road surface. 27 feet North of a stop sign. Marked "M.C.D.D. No. 1 BM 2".

Horizontal Datum: NAD-83.

Vertical Datum: NAVD-88.

Grid:

X= 2,935,447.05 U.S. Ft.

Y= 13,565,832.33 U.S. Ft.

Elevation: 57.08'

Latitude: N 29° 00' 57.262"

Longitude: W 95° 58' 26.780"

Datum: WGS-84

Type of Monument: Brass disk marked "M.C.D.D. No. 1 BM No. 2" - Set (5/11/09).

Horizontal & Vertical data derived by GPS observations on 5/12/09 processed with a precise ephemeris and Geoid 03 using a constrained network of NGS monuments R757 and L576 for vertical reference and NGS monument CITYPORT for horizontal and vertical reference.

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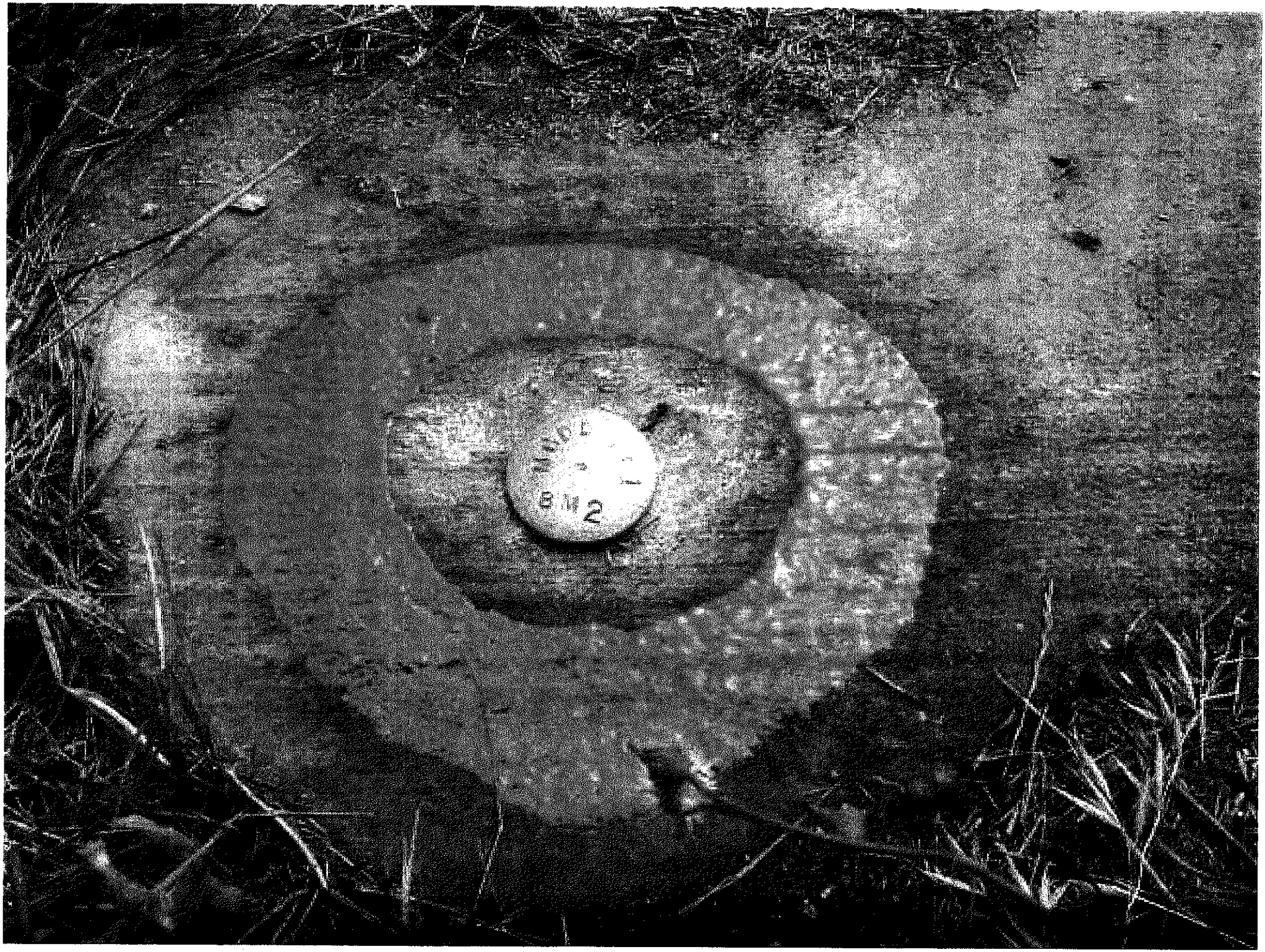
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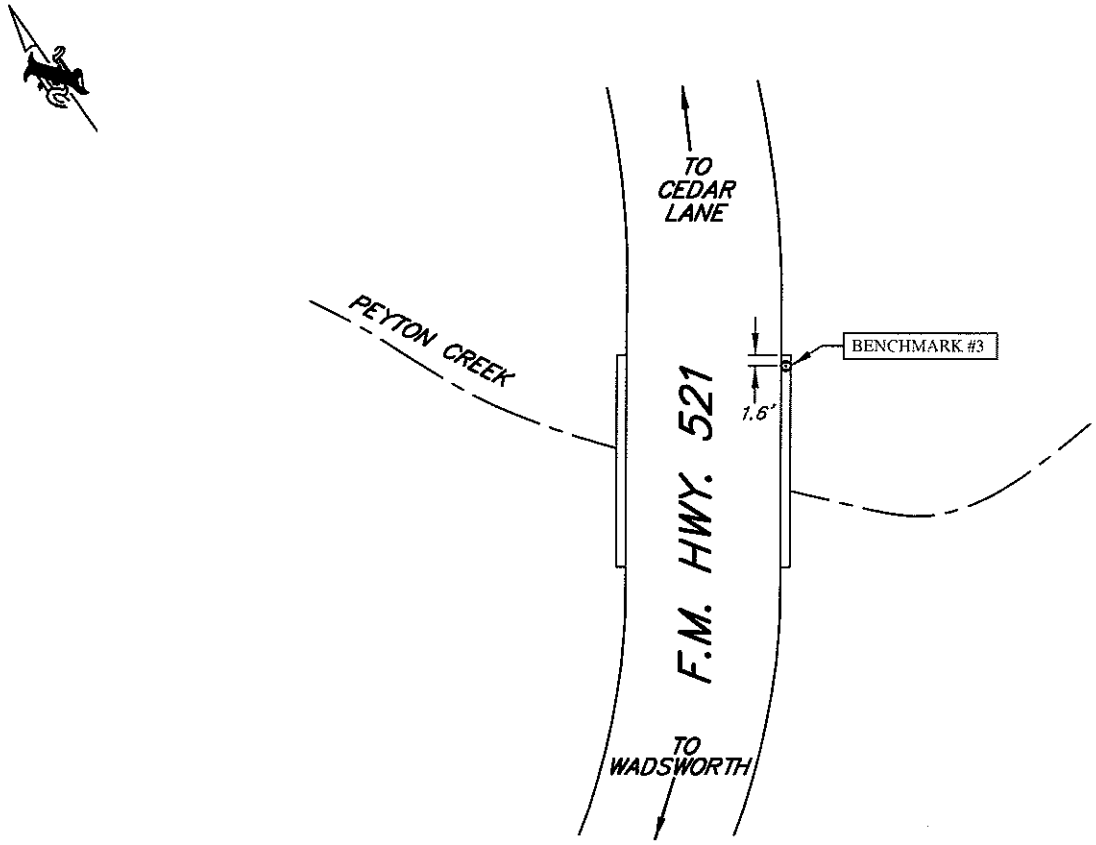

SCALE: N.T.S.

M.C.D.D. NO. 1 BENCHMARK NO. 3

General Location:

Benchmark M.C.D.D. No. 1 BM No. 3 is located in Matagorda, Texas. 5 miles East of Wadsworth, Texas. Mark is in a bridge guardrail over Peyton Creek. From intersection of State Highway 60 and F.M. Highway 521 in Wadsworth, proceed East along F.M. Highway 521 5.45 miles to bridge over Peyton Creek. Mark is in the top of the Northeast end of the Southeast guardrail of bridge. 1.6 feet Southwest of the Northeast end. Marked "M.C.D.D. No. 1 B.M. No. 3".

Horizontal Datum: NAD-83.

Vertical Datum: NAVD-88.

Grid:

X= 2,976,026.67 U.S. Ft.

Y= 13,502,759.22 U.S. Ft.

Elevation: 14.86'

Latitude: N 28° 50' 22.371"

Longitude: N 95° 51' 08.962"

Datum: WGS-84

Type of Monument: Brass disk marked "M.C.D.D. No. 1 BM No. 3" - Set (5/11/09).

Horizontal & Vertical data derived by GPS observations on 5/13/09 processed with a precise ephemeris and Geoid 03 using a constrained network of NGS monuments S1256 and R571 for vertical reference and NGS monument CITYPORT for horizontal and vertical reference.

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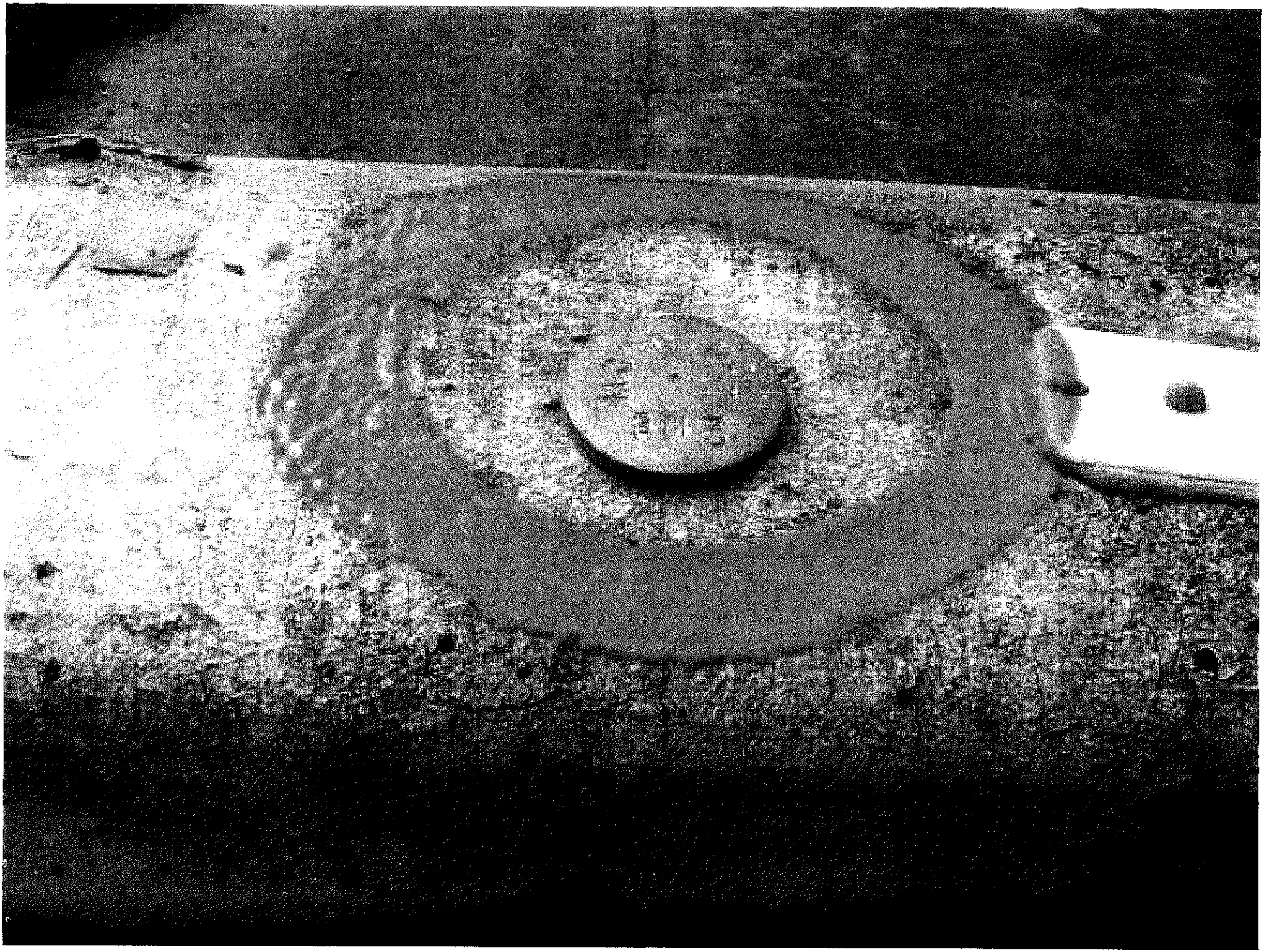

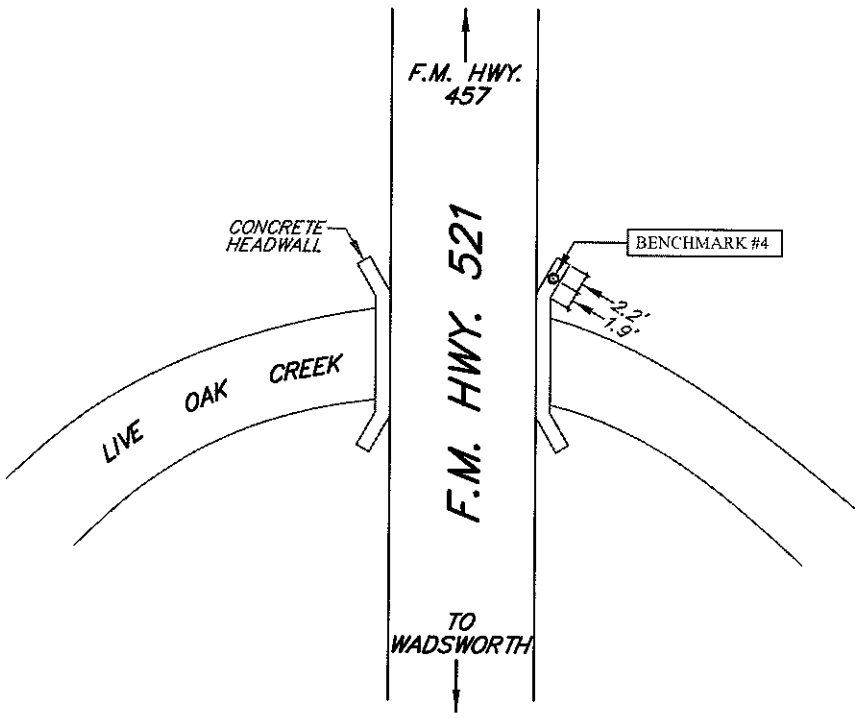

SCALE: N.T.S.

M.C.D.D. NO. 1 BENCHMARK NO. 4

General Location:

Benchmark M.C.D.D. No. 1 BM No. 4 is located in Matagorda County, Texas, approximately 10 miles East of Wadsworth, Texas, and 4.5 miles Southwest of the community known as Cedar Lane. Mark is in a bridge guardrail over Live Oak Creek. From intersection of F.M. Highway 521 and F.M. Highway 457, proceed Southwest along F.M. Highway 521 4.6 miles to bridge over Live Oak Creek. Mark is in the top of the Northeast end of the Southeast guardrail of bridge. 2.2 feet Southwest of the Northeast end. Marked "M.C.D.D. No. 1 B.M. No. 4".

Horizontal Datum: NAD-83.

Vertical Datum: NAVD-88.

Grid:

X= 2,997,007.69 U.S. Ft.

Y= 13,521,630.80 U.S. Ft.

Elevation: 22.04'

Latitude: N 28° 53' 23.506"

Longitude: W 95° 47' 07.286"

Datum: WGS-84

Type of Monument: Brass disk marked "M.C.D.D. No. 1 BM No. 4" - Set (5/11/09).

Horizontal & Vertical data derived by GPS observations on 5/13/09 processed with a precise ephemeris and Geoid 03 using a constrained network of NGS monuments S1256 and R571 for vertical reference and NGS monument CITYPORT for horizontal and vertical reference.

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SURVEYOR-C.D.K./DRAFTSMAN-BA.H. JOB No. R0003-004-00

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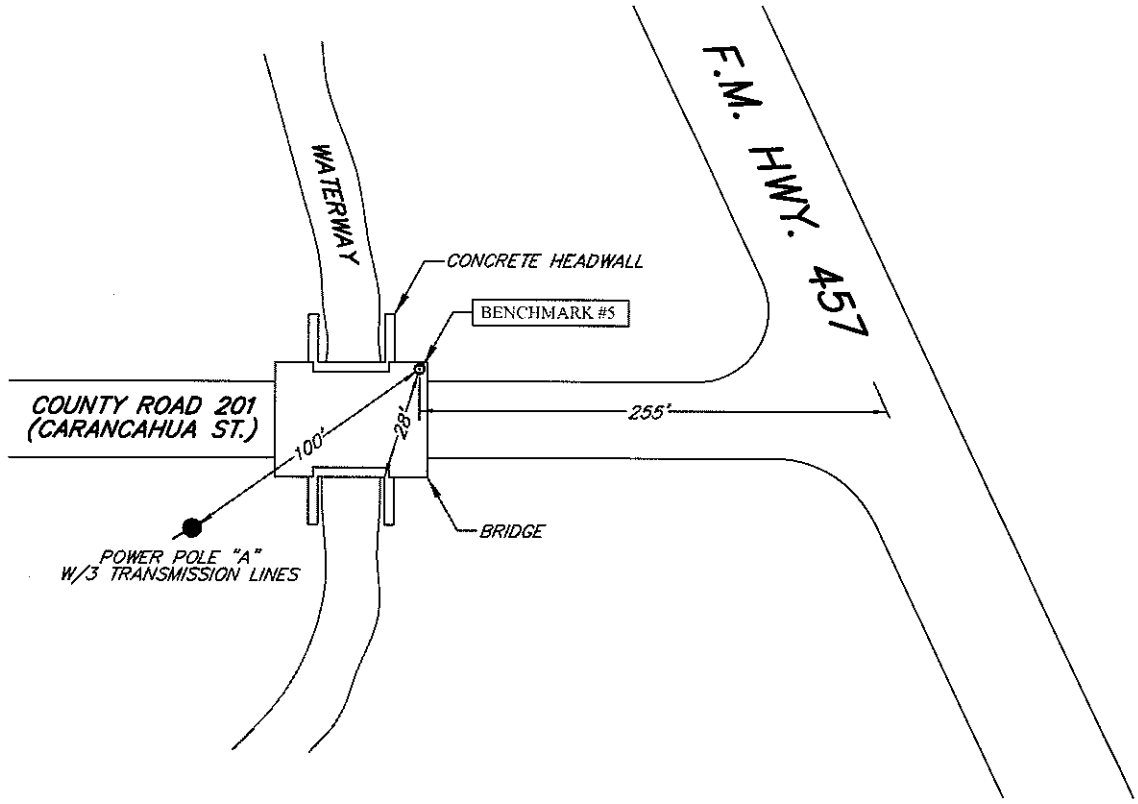


SCALE: N.T.S.

M.C.D.D. NO. 1 BENCHMARK NO. 5

General Location:

Benchmark M.C.D.D. No. 1 BM No. 5 is located in Matagorda County, Texas approximately 7.0 miles South of the intersection of F.M. Hwy. 2611 and F.M. Hwy. 457, and 255 feet West of F.m. Hwy. 457 along County Road 201 on a concrete headwall in the Northwest corner of a bridge.

Horizontal Datum: NAD-83.

Vertical Datum: NAVD-88.

Grid:

X= 3,049,279.26 U.S. Ft.

Y= 13,483,817.40 U.S. Ft.

Elevation: 10.9'

Latitude: N 28° 46' 54.674"

Longitude: W 95° 37' 31.722"

Datum: WGS-84

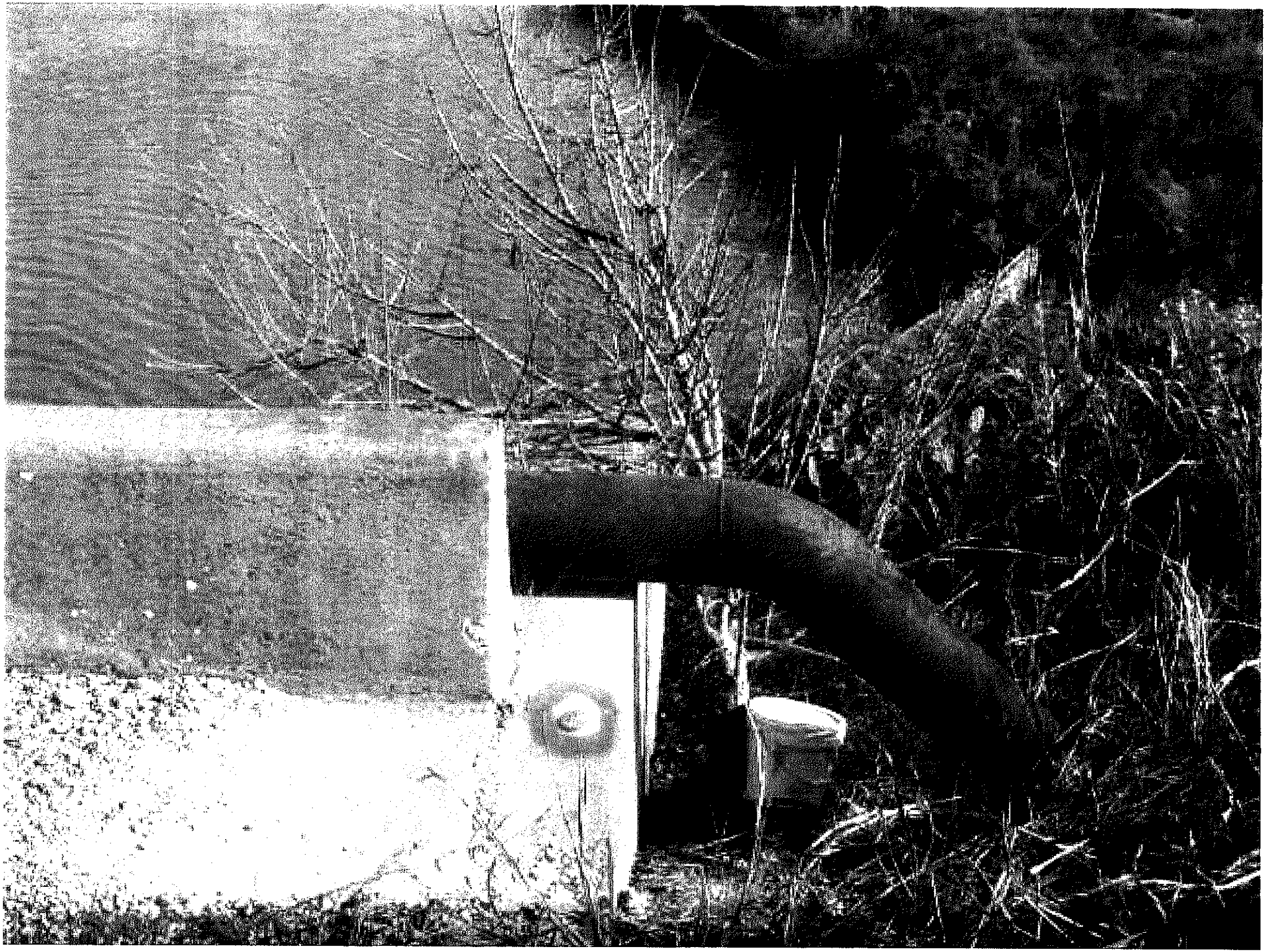
Type of Monument: Brass disk marked "M.C.D.D. No. 1 BM No. 5" - Set (5/11/09).

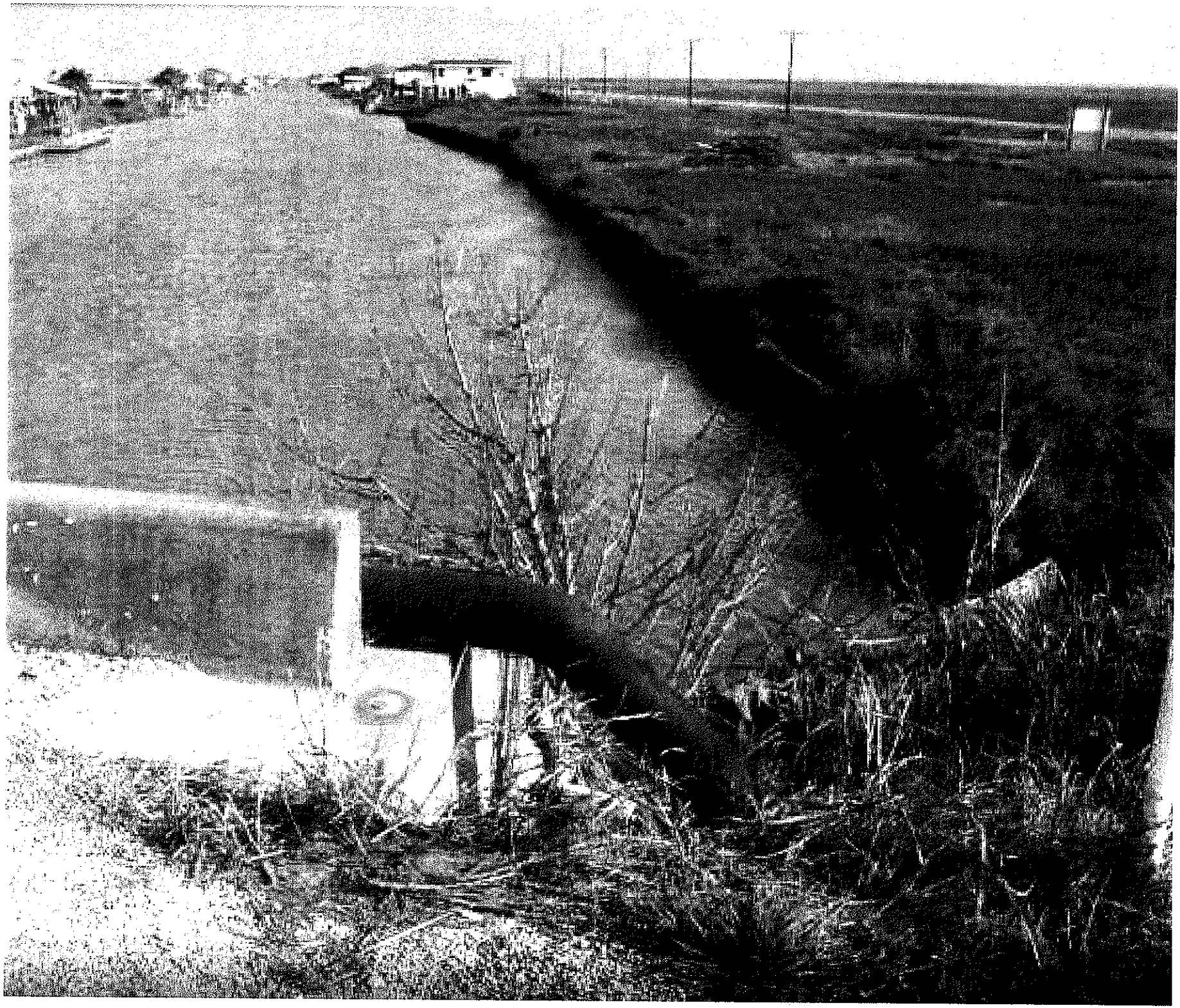
Horizontal & Vertical data derived by GPS observations on May, 2009, processed with a precise ephemeris and Geoid 03 using a constrained network of CORS sites TXAG, TXVA, & ARP7 for vertical reference and NGS monument CITYPORT for horizontal and vertical reference.

CHARLIE KALKOMEY Surveying, Inc. Land Surveyors
SINCE 1978
6415 Reading Road · Rosenberg, Texas 77471-5655
281 342-2033 · 281 232-9909 (Fax)
a Jones & Carter Company
Austin • Brenham • Bryan • Dallas • Houston
Rosenberg • San Antonio • The Woodlands

P:\PROJECTS\Benchmark Drawings\BM #5.dwg Jun 23,2009 - 6:56am BH

SURVEYOR-C.D.K./DRAFTSMAN-BA.H. JOB No. R0003-004-00





Attachment C

Resolutions Adopting the Plan; Questionnaire and News Articles

RESOLUTION NO. 2010-R-1

A RESOLUTION OF THE CITY OF PALACIOS, TEXAS, FOR APPROVAL OF THE MATAGORDA COUNTY FLOOD MITIGATION PLAN

WHEREAS, natural hazards in the City of Palacios historically have caused significant flood disasters with losses of life and property and natural resources damage; and

WHEREAS, the Flood Mitigation Assistance (FMA) Program requires communities to adopt a flood mitigation action plan to be eligible for FMA Program funding; and

WHEREAS, the City of Palacios coordinated the flood mitigation planning effort with Matagorda County and the City of Bay City, and the Texas Colorado River Floodplain Coalition all-hazards Mitigation Plan that encompasses the Lower Colorado River Watershed, and created a framework for coordinated and focused flood hazard mitigation actions at both the local and regional levels; and

WHEREAS, Matagorda County and the cities of Palacios and Bay City have been an active participant in the regional mitigation planning process, as well as having conducted and documented its own public involvement process; and

WHEREAS, the City of Palacios has incorporated comments and recommendations from the Texas Water Development Board and FEMA into the Matagorda County Flood Mitigation Plan; and

WHEREAS, the Matagorda County Flood Mitigation Plan is a record of the City's potential flood risks and hazards and a commitment to reducing the long-term consequences of flood hazards. The Flood Mitigation Plan outlines mitigation goals, identifies risk reduction strategies for flood hazards that threaten the area, and discusses the ongoing risk reduction strategies to be undertaken within the jurisdiction.

NOW THEREFORE BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF PALACIOS, TEXAS:

SECTION 1. The Matagorda County Flood Mitigation Plan is approved in its entirety, incorporating both local and multi-jurisdictional elements.

SECTION 2. The City of Palacios will pursue available funding opportunities for implementation of the proposals designated therein, and will, upon receipt of such funding or other necessary resources, seek to implement the actions contained in the mitigation strategies.

SECTION 3. The City of Palacios will continue to participate in the multi-jurisdictional mitigation planning process, including reporting of progress as required by FEMA and the Texas Water Development Board.

SECTION 4. This Resolution shall become effective immediately after its approval and adoption.

PASSED, APPROVED AND ADOPTED on this 12th day of January, 2010.

CITY OF PALACIOS, TEXAS

Bert West

BERT WEST, Mayor Pro-Tem

Keri G Berger

KERI BERGER, City Secretary

RANDALL B. STRONG, City Attorney

THE CITY OF PALACIOS TEXAS

Order accepting the City of Bay City's Resolution No. R-2009-24 approving the Matagorda County Flood Mitigation Plan and the City of Palacios's Resolution No. 2010-R-1 approving the Matagorda County Flood Mitigation Plan and adopt the Matagorda County Flood Mitigation Plan as approved by City of Bay City and the City of Palacios

BE IT REMEMBERED, that on this 25th day of January, 2010, the Commissioner's Court of Matagorda County, Texas met in **Regular Session**, with a quorum in attendance, and upon motion duly made by County Judge McDonald and seconded by Commissioner Gibson, with all others concurring, to accept the City of Bay City's Resolution No. R-2009-24 approving the Matagorda County Flood Mitigation Plan and the City of Palacios's Resolution No. 2010-R-1 approving the Matagorda County Flood Mitigation Plan and adopt the Matagorda County Flood Mitigation Plan as approved by City of Bay City and the City of Palacios, per documentation attached hereto and made a part hereof.

PASSED IN OPEN COURT this 25th day of January, 2010.

Nate McDonald

Nate McDonald, County Judge
Matagorda County, Texas

Motion Id: 14-5494
Motion Date: 01/25/10

RESOLUTION NO. R-2009-24

RESOLUTION FOR APPROVAL OF THE MATAGORDA COUNTY FLOOD MITIGATION PLAN

WHEREAS, natural hazards in the City of Bay City historically have caused significant flood disasters with losses of life and property and natural resources damage; and

WHEREAS, the Flood Mitigation Assistance (FMA) Program requires communities to adopt a flood mitigation action plan to be eligible for FMA Program funding; and

WHEREAS, the City of Bay City coordinated the flood mitigation planning effort with Matagorda County and the City of Palacios, and the Texas Colorado River Floodplain Coalition all-hazards Mitigation Plan that encompasses the Lower Colorado River Watershed, and created a framework for coordinated and focused flood hazard mitigation actions at both the local and regional levels; and

WHEREAS, Matagorda County and the cities of Bay City and Palacios have been an active participant in the regional mitigation planning process, as well as having conducted and documented its own public involvement process; and

WHEREAS, the City of Bay City has incorporated comments and recommendations from the Texas Water Development Board and FEMA into Matagorda County Flood Mitigation Plan.

WHEREAS, the Matagorda County Flood Mitigation Plan is a record of the City's potential flood risks and hazards and a commitment to reducing the long-term consequences of flood hazards. The Flood Mitigation Plan outlines mitigation goals, identifies risk reduction strategies for flood hazards that threaten the area, and discusses the ongoing risk reduction strategies to be undertaken within the jurisdiction.

NOW THEREFORE BE IT RESOLVED THAT:

Section 1: The Matagorda County Flood Mitigation Plan is approved in its entirety, incorporating both local and multi-jurisdictional elements.

Section 2: The City of Bay City will pursue available funding opportunities for implementation of the proposals designated therein, and will, upon receipt of such funding or other necessary resources, seek to implement the actions contained in the mitigation strategies.

RESOLUTION NO. R-2009-24

RESOLUTION FOR APPROVAL OF THE MATAGORDA COUNTY FLOOD MITIGATION PLAN

WHEREAS, natural hazards in the City of Bay City historically have caused significant flood disasters with losses of life and property and natural resources damage; and

WHEREAS, the Flood Mitigation Assistance (FMA) Program requires communities to adopt a flood mitigation action plan to be eligible for FMA Program funding; and

WHEREAS, the City of Bay City coordinated the flood mitigation planning effort with Matagorda County and the City of Palacios, and the Texas Colorado River Floodplain Coalition all-hazards Mitigation Plan that encompasses the Lower Colorado River Watershed, and created a framework for coordinated and focused flood hazard mitigation actions at both the local and regional levels; and

WHEREAS, Matagorda County and the cities of Bay City and Palacios have been an active participant in the regional mitigation planning process, as well as having conducted and documented its own public involvement process; and

WHEREAS, the City of Bay City has incorporated comments and recommendations from the Texas Water Development Board and FEMA into Matagorda County Flood Mitigation Plan.

WHEREAS, the Matagorda County Flood Mitigation Plan is a record of the City's potential flood risks and hazards and a commitment to reducing the long-term consequences of flood hazards. The Flood Mitigation Plan outlines mitigation goals, identifies risk reduction strategies for flood hazards that threaten the area, and discusses the ongoing risk reduction strategies to be undertaken within the jurisdiction.

NOW THEREFORE BE IT RESOLVED THAT:

Section 1: The Matagorda County Flood Mitigation Plan is approved in its entirety, incorporating both local and multi-jurisdictional elements.

Section 2: The City of Bay City will pursue available funding opportunities for implementation of the proposals designated therein, and will, upon receipt of such funding or other necessary resources, seek to implement the actions contained in the mitigation strategies.

Section 3: The City of Bay City will continue to participate in the multi-jurisdictional mitigation planning process, including reporting of progress as required by FEMA and the Texas Water Development Board.

Section 4: This resolution is in effect immediately.

Signed this 17th day of December, in the year 2009.

Richard Knapik

Richard Knapik, Mayor

ATTEST:

Rhonda Clegg

Rhonda Clegg, City Secretary

THE CITY OF BAY CITY TEXAS

APPROVED AS TO FORM AND SUBSTANCE:

William R. Pendergraft, City Attorney

Matagorda County Flood Mitigation Plan Questionnaires 19-May-09 Halff Associates, Inc.

	Question #1	Question #2	Question #3	Question #4	Flooding Source	depth in Home	Question #5	Question #6 Recommendations	Question #7
1	No	No	No				Bay City	Repair Levees	Haskel Simon
2	No	No	No				Bay City	Clean Cottonwood Creek	Work in Bay City, Live Old Var Vlock Rd
3	No	No	No	No			Co.	Study Tres Palacios, Require detention	341 CR 355 Palacios
4	Yes	Yes	No				Co.	Clean & dredge creeks	Lisa Krobot, 411 PR 505, Bay City
5	Yes	No	No				Bay City	Dredge Mitchell Cut & Caney (mouth)	411 CR 296, Bay City
6	Yes	Yes	No				Co.	Dredge Mitchell Cut & Caney (mouth)	1970 CR 297
7	Yes	Yes	Yes	1961 Carla			Co.	Dredge Mitchell Cut & Caney Ck at Intercoastal	Edward Staninfer 840 CR 206, Sargent
8	Yes	Yes	Yes	1961 Carla			Co.	Dredge Mitchell Cut & Caney Ck at Intercoastal	Edward Staninfer 840 CR 206, Sargent
9	Yes	Yes	No				Co.	Dredge Mitchell Cut & Caney Ck at Intercoastal	1970 CR 297
10	Yes	No	No				Co.	Dredge Mitchell Cut & Caney Ck at Intercoastal	411 CR 296, Bay City
11	Yes	No	No				Co.		Doris Young, 460 Seagull, Sargent
12	Yes	Yes	Yes				Co.		D W Benthall, 872 Seagull, Sargent
13	Yes	Yes	No				Co.	Dredge Mitchell Cut & Caney Ck at Intercoastal	Ruth Risinger, 213 Dolphin Way, Sargent
14	Yes	Yes	No				Co.	Dredge Mitchell Cut	Violette/Sherman Brown 24021 FM 457, Sargent V/S Brown (motel) 26274 FM 457, Sargent
15	Yes	Yes	No				Co.		Foster Watts Jr, 1801 Willow, Richmond, Tx 77469
16	Yes	No	No				Co.		Sharon Trainor, Morganzer Rd, Sargent
17	Yes	No	No				Co.		Rayanna Sury, 912 Gulf View, Sargent
18	Yes	No	No				Bay City		Cin Tipps, 1252 CR 201, Bay City
19	Yes	Yes	Yes	Oct-08 Sep-02	Caney Ck	8"	Co.	Keep San Bernard open Dredge Mitchells Cut	Carolyn Avera, 1490 CR 201 Bay City
20	Yes	Yes	No				Co.	Dredge mouth of San Bernard Dredge Mitchells Cut	C. Fuelnight, 196 Live Oak Bend, Sargent
21	Yes	No	No				Co.		June Drake, 1245 Gulfview, Sargent
22	Yes	Yes	No				Co.	Build sand dunes on Sargent Raise Seawall	Ernest Brauner, Sargent
23	Yes	Yes	No				Co.		Joe Heaton, 1942 CR 206, Sargent
24	Yes	Yes	No	2004 2007 9/12/2008		2'	Co.	Dredge Mitchell Cut & Caney (mouth)	Wilber Auders, 217 Plum Circle, Lake Jackson 77566 House elevated. Room and storage area below has flooded several times
25	Yes	Yes	No				Co.	Dredge Mitchell Cut	Sargent
26	Yes	Yes	Yes		Coastal flooding		Co.	County needs building code authority and stricter development and inspection requirements.	Sargent - Robert Wall 281/331-8200
27	No	Yes	No				Co.		1699 CR 291, Bay City
28	No	No	No				Co.	Dredge Mitchell Cut & Caney (mouth)	M J Porretto, 340 Seagull, Bay City
29	Yes	Yes	Yes	Sep-08	Coastal flood	12"	Co.	Dredge Caney Ck at Intercoastal	J. N. Richbourg, 434 Seagull, Sargent
30	Yes	Yes	Unknown				Co.	Construct diversion channel from Caney Ck to Lake Austin per Mat. Co Drainage District #2	Don/Mary Kemp, 834 CR 298, Sargent
31	Yes	Yes	No				Co.	Improve Caney Ck with bulkheads	Tommy Mapp, 961 PR 671, Sargent
32	Yes	No	Yes	1961 Carla	Caney Ck	18" +	Co.	Dredge Mitchell Cut & Caney Ck	Bob Aaron, 199 Creekside Dr., Sargent
33	Yes	No	Yes	1961 Carla	Caney Ck	18"	Co.	Dredge Mitchell Cut & Caney Ck	Virginia Derbasm, 197 Creekside, Sargent
34	Yes	Yes	No				Co.	Dredge Mitchell Cut & Caney Ck	Frank Graham, 1779 PR 652, Sargent
35	Yes	Yes	No				Co.		Mike Lowe, 32 Live Oak Bend, Sargent
36	Yes	Yes	No				Co.	Improve Caney Ck	C. King, 1197 CR 202, Sargent
37	Yes	Yes	No				Co.	Improve Caney Ck	Kathy King, 1197 CR 202 Sargent
38	Yes	No	No				Co.	Dredge Mitchell Cut & Caney (mouth)	Alan Fuller, 220 Seagull, Sargent
39	Yes	No	Yes	9/13/08 Claudette	Caney Ck	2'	Co.	Improve Caney Ck	Portetto, 340 Seagull, Sargent
40	No	No	No				Bay City	Clear ditches of brush/obstructions Clean drainage inlets Adopt porous pavement design Reduce use of curbs in parking areas	Owen Brudau, 3928 Wickersham, Bay City
41	Yes	No	No				Co.	Dredge Mitchell Cut & Caney Ck	EJ/Delores Smith, 862 CR 206, Sargent
42	Yes	No	No				Co.	Stop Wharton Co. water from flowing into Caney Creek. Dredge Mitchell Cut and Caney Creek mouth	Larry Williams, 846 CR 206, Sargent
43	Yes	Yes	No				Co.	Clean drainage ditches but do not Cut trees along Caney creek	Lee Dannhaus, 149 PR 672, Bay City Pecan Shadows Area
44	Yes	No	No				Co.	Clean ditches	C. Schmid, 360 Seagull, Sargent

Yes	38	25	9	3	3	greater than 12"
No	6	19	34	3	3	less than 12"
Unknown			1			

Mat Co.	39
Bay City	5
Palacios	0

Attachment D

Matagorda County Flood Insurance Rate Maps and Firmettes

Rec 4/27/90 cm

Federal Emergency Management Agency

Region VI, Federal Center, 800 North Loop 288
Denton, Texas 76201-3698

NTH

April 23, 1990

Mr. Clyde E. McKinney
Floodplain Administrator,
Matagorda County
1821 13th Street
Bay City, Texas 77414

Dear Mr. McKinney:

This is in reference to a letter dated March 12, 1990, submitted by Mr. Bruce W. Graham of G&W Engineers, Inc., to the Federal Emergency Management Agency (FEMA). In his letter, Mr. Graham requested that we evaluate additional technical data submitted in support of a Base (100-year) Flood Elevation (BFE) determination for the Colorado River in the vicinity of the Rolling Woods Subdivision in Matagorda County, Texas. The additional technical data included the following: a current gage height to discharge curve dated January 8, 1985; and discharge information for the Bay City Gage Station dated February 2, 1990, from the U.S. Geological Survey - Water Resources Division.

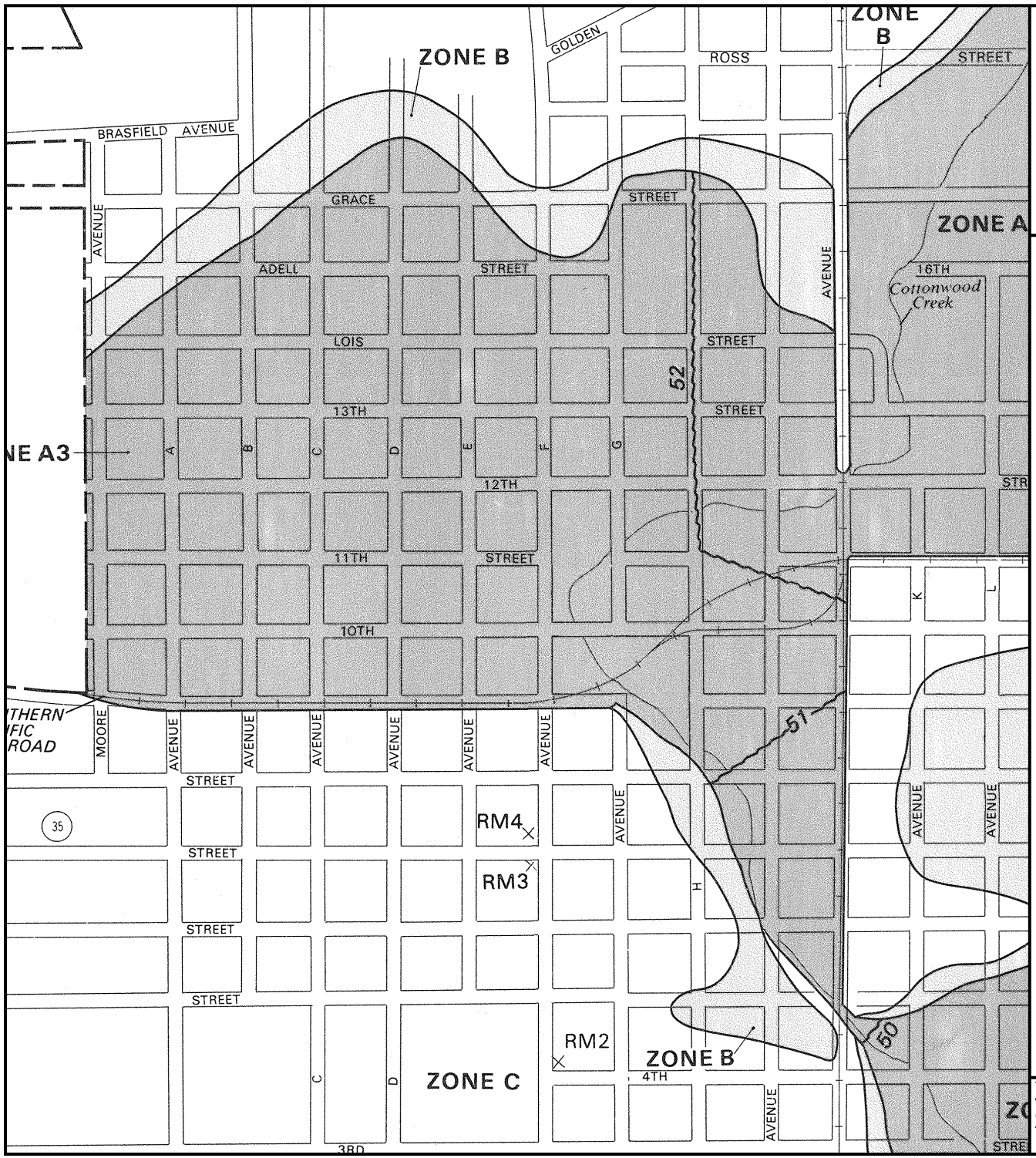
Upon review of the additional technical data for the aforementioned area, we have determined that a BFE of 50.0 feet is acceptable, as recommended by G&W Engineers on behalf of the developer. FEMA's recommendation is that the required elevation for the lowest floor of any development within Rolling Woods Subdivision be at or above 50.0 feet National Geodetic Vertical Datum of 1929. This recommendation supersedes that which was outlined in our December 19, 1989 letter.

Should you have any questions with regard to the information contained in this letter or with other floodplain management issues, please contact our office at the above address or call Mr. Bill Kuno at (817) 898-9134.

Sincerely,

Jim LeGrotte
Deputy Division Chief
Natural and Technological
Hazards Division

cc: Mr. Bruce Graham, G&W Engineers



APPROXIMATE SCALE

800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

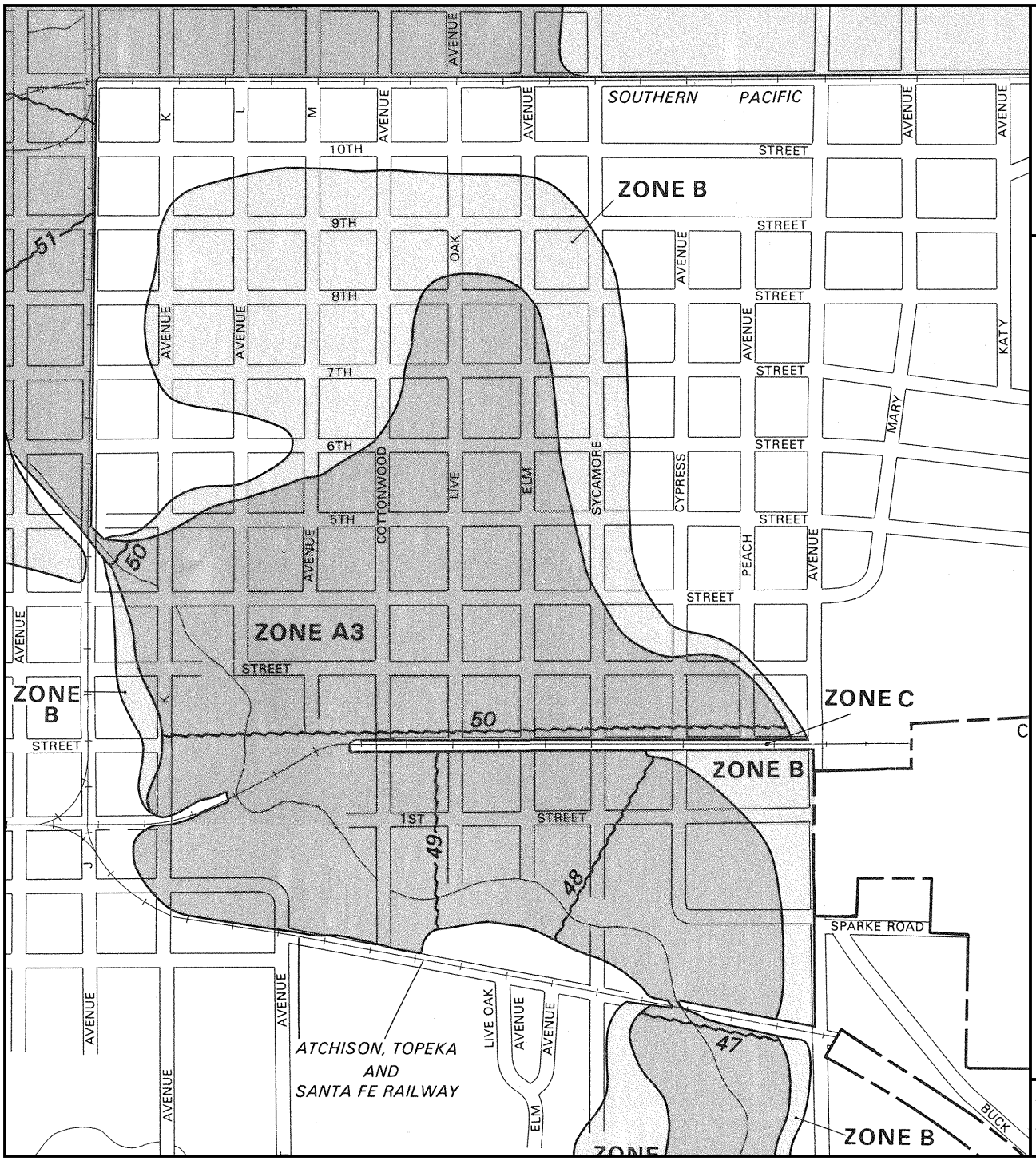
CITY OF
BAY CITY, TEXAS
MATAGORDA COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
485455 0005 C

MAP REVISED:
JUNE 5, 1985

Federal Emergency Management Agency



N

APPROXIMATE SCALE

800 0 800 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF
BAY CITY, TEXAS
MATAGORDA COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
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MAP REVISED:
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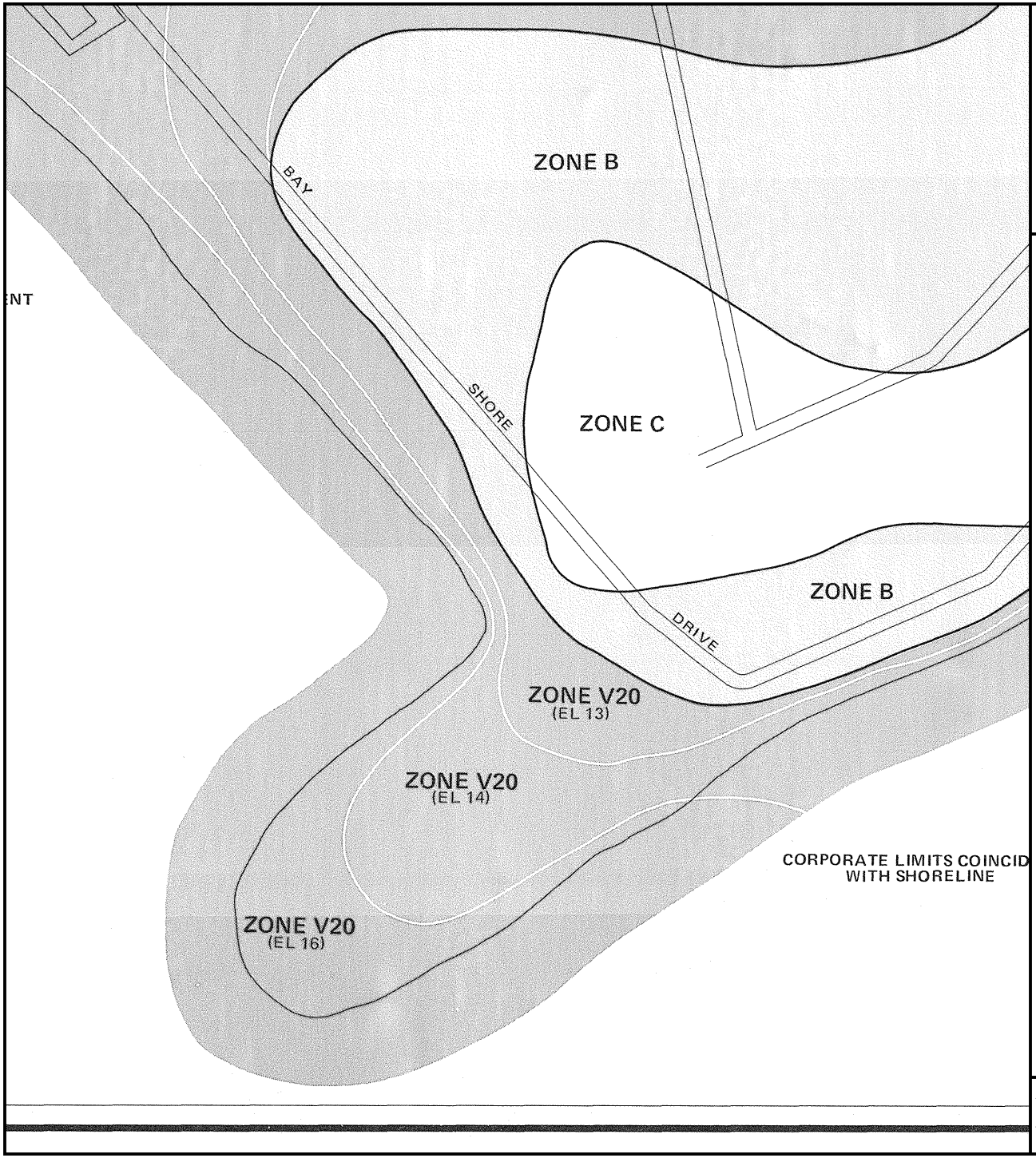


APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF
PALACIOS,
TEXAS
MATAGORDA
COUNTY

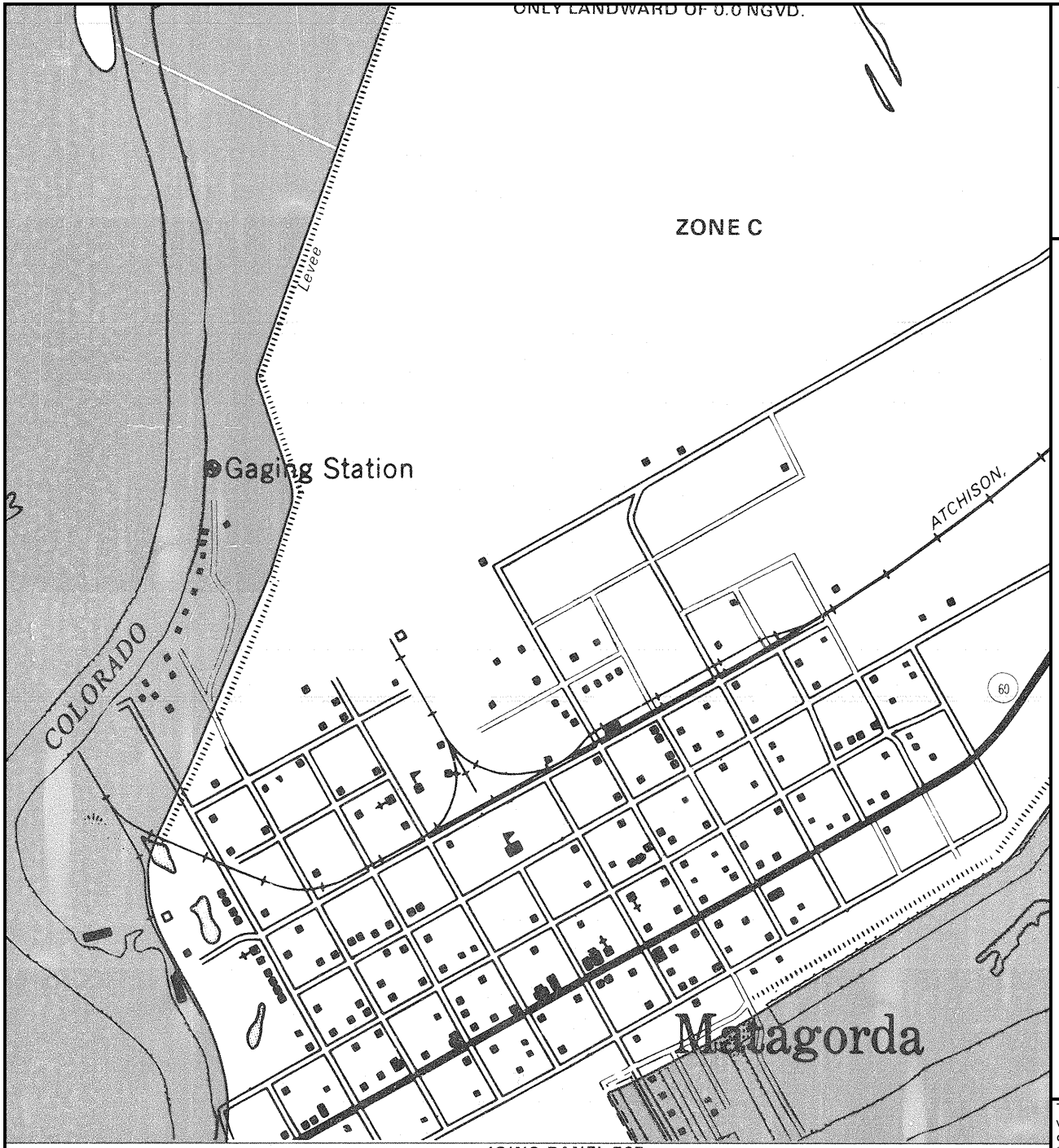
PANEL 2 OF 2

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
485495 0002 D

MAP REVISED:
FEBRUARY 5, 1986

Federal Emergency Management Agency



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APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MATAGORDA COUNTY, TEXAS
(UNINCORPORATED AREAS)

PANEL 555 OF 775

(SEE MAP INDEX FOR PANELS NOT PRINTED)

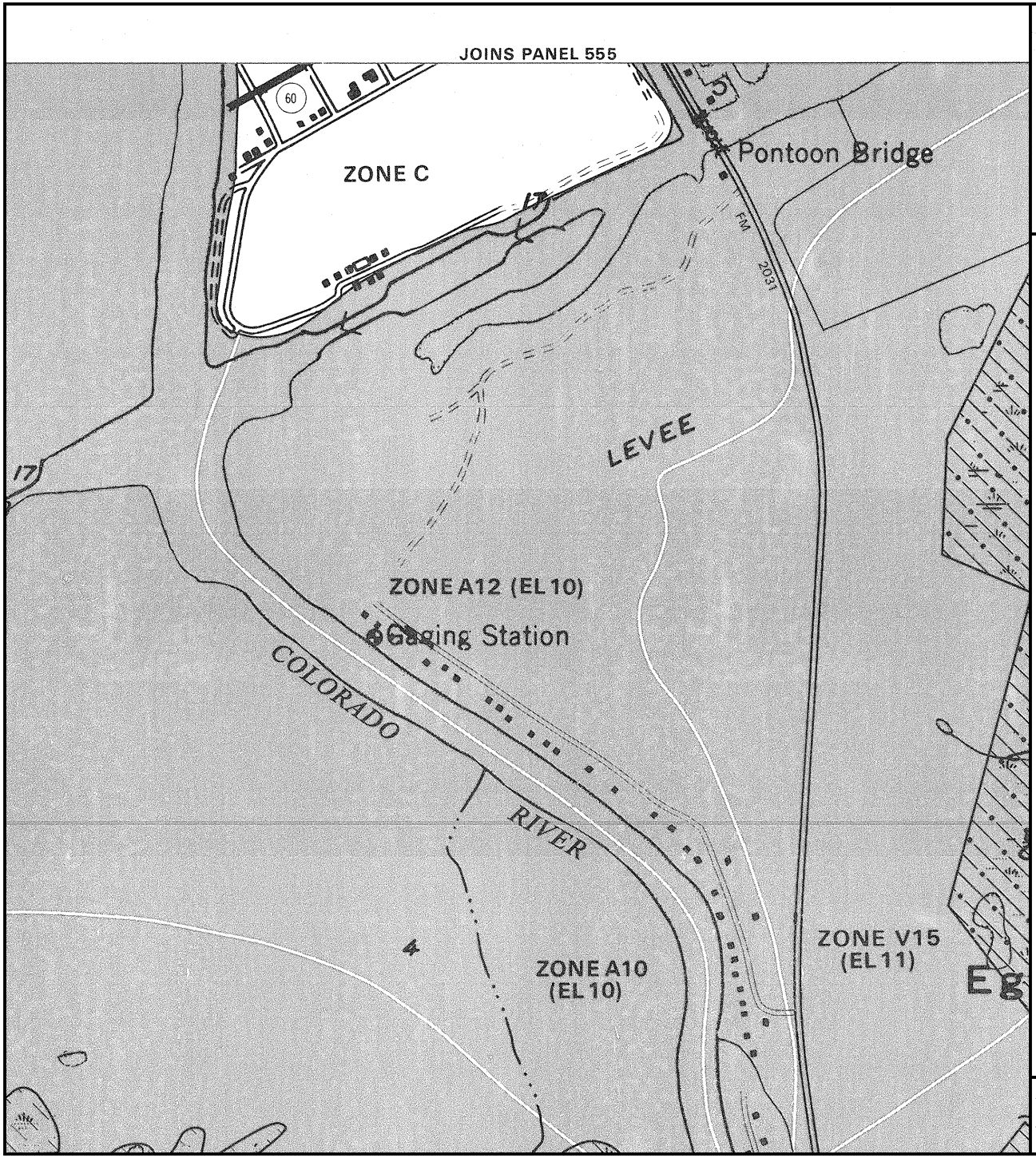
NOTE

THIS MAP INCORPORATES APPROXIMATE BOUNDARIES OF COASTAL BARRIER RESOURCES SYSTEM UNITS AND/OR OTHERWISE PROTECTED AREAS ESTABLISHED UNDER THE COASTAL BARRIER IMPROVEMENT ACT OF 1990 (PL 101-591).

COMMUNITY-PANEL NUMBER
485489 0555 D

MAP REVISED:
MAY 4, 1992

Federal Emergency Management Agency



N

APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MATAGORDA COUNTY, TEXAS
(UNINCORPORATED AREAS)

PANEL 565 OF 775

(SEE MAP INDEX FOR PANELS NOT PRINTED)

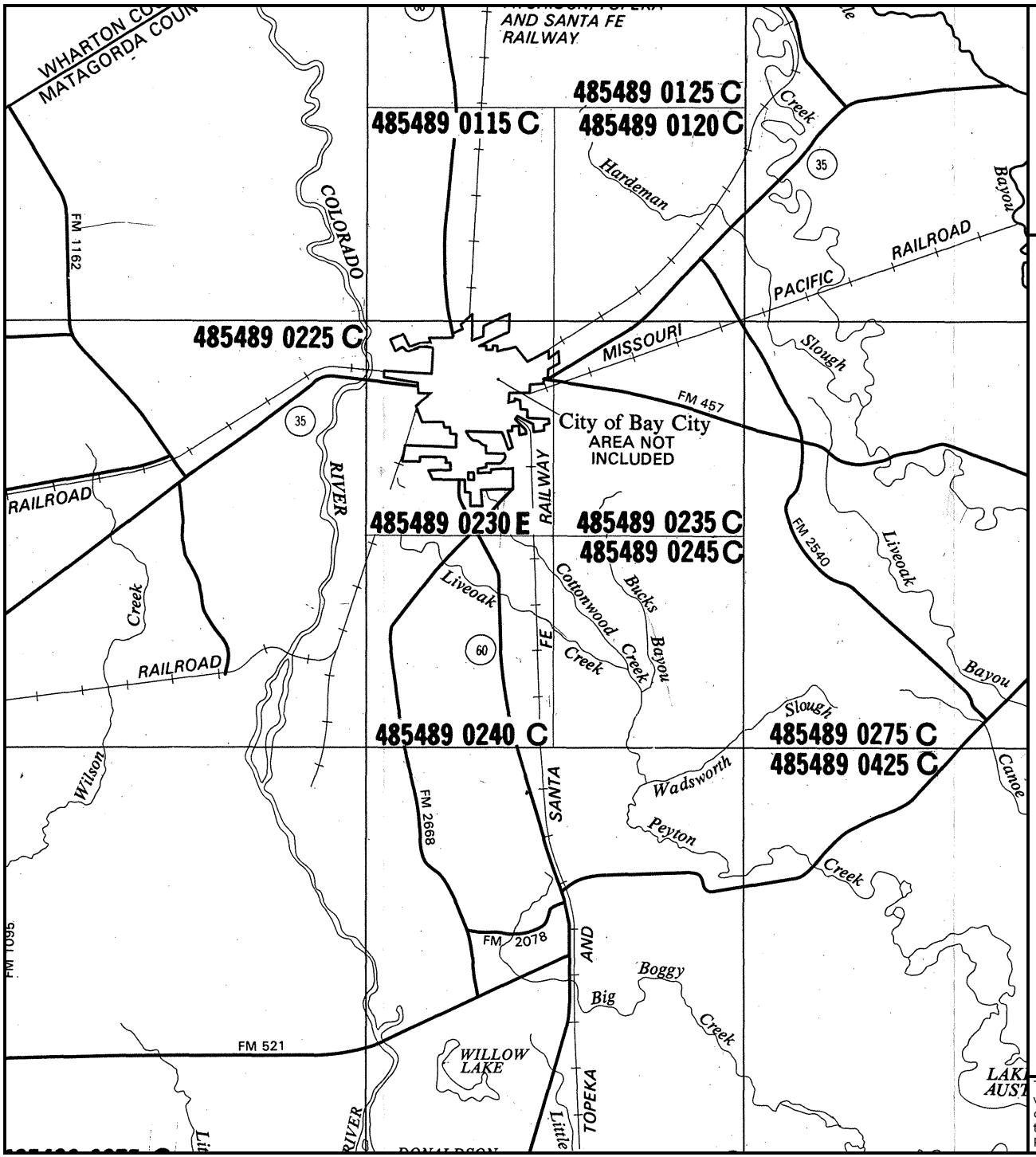
NOTE

THIS MAP INCORPORATES APPROXIMATE BOUNDARIES OF COASTAL BARRIER RESOURCES SYSTEM UNITS AND/OR OTHERWISE PROTECTED AREAS ESTABLISHED UNDER THE COASTAL BARRIER IMPROVEMENT ACT OF 1990 (PL 101-591).

COMMUNITY-PANEL NUMBER
485489 0565 D

MAP REVISED:
MAY 4, 1992

Federal Emergency Management Agency



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NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MATAGORDA COUNTY, TEXAS

(UNINCORPORATED AREAS)

MAP INDEX

PANELS PRINTED: 25, 50, 75, 100, 115, 120, 125, 150, 175, 200, 225, 230, 235, 240, 245, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 501, 502, 503, 504, 525, 550, 555, 560, 565, 570, 600, 625, 675, 700, 725, 750, 775

COMMUNITY-PANEL NUMBER
485489 0001-0775

MAP REVISED:
MAY 4, 1992

Federal Emergency Management Agency