Report on the Flooding of April 27-28, 2009
To Piney Point Village City Council
From Fred Garcia, Harris County Flood Control District
May 28, 2009 at 6:30 PM

GENERAL FLOODING STATEMENT

A large thunderstorm complex that originated in northwest Texas moved into Harris County late in the afternoon on Monday, April 27th producing very heavy rainfall and significant street flooding. The complex pushed offshore before midnight and weakened while the old outflow boundary on the western end retreated northward from Matagorda and Brazoria Counties. As this boundary entered into western Harris County a cluster of thunderstorms developed between Tomball and Katy and remained nearly stationary. Hourly rainfall rates of 3.0-4.0 inches per hour on top of 4.0-5.0 inches of rainfall in the late afternoon of the 27th produced major flooding across the western half of Harris County. The cluster began to drift east-southeast across the upper portions of Brays, Buffalo, and White Oak Bayous around 5:30 a.m. and then weakened as it tracked into the central part of the county. Rainfall resulted in rapid rises along upper Brays, Buffalo, and upper White Oak Bayous and major flooding of creeks in the western and northern portions of the county. Extensive street flooding closed portions of I-10 W feeder roads, part of US 59 at the 610 Loop, mainlanes of I-45 at Spring Stuebner, and parts of the west Sam Houston Tollway.

The event was the third in a series of excessive rainfall events across Harris County which began on the April 18th. Grounds were wet going into the rainfall on the afternoon of the 27th and completely saturated prior to the onset of the excessive rains during the morning hours of the 28th. The saturated grounds and intense rainfall rates led to the rapid and in places near record flood levels. In fact, the flows recorded by the USGS gage at Piney Point on Buffalo Bayou exceeded the flood of record in March of 1992. Tremendous inflow into Addicks Reservoir resulted in the flooding of HWY 6 and Eldridge Parkway for the first time since October of 2002, and for several hours during the morning of Tuesday, April 28th water from overflowing Bear Creek was flowing across HWY 6. High water marks obtained by HCFCD crews indicate the highest levels ever recorded along portions of Bear Creek, Langham Creek, and South Mayde Creek.

RAINFALL

Duration –Heavy rains fell between 4:00 p.m. and 10:00 p.m. on the 27th with a brief break before the development and onset of excessive rainfall just after midnight on the 28th and continuing through 8:00 a.m. The most extreme rainfall fell between 1:00 a.m. and 4:00 a.m. over much of Addicks Reservoir.

Total Amounts – 24-hr storm totals averaged 6.0-8.0 inches from just west of The Woodlands to northeast of Katy with totals of 9.0-11.5 inches across the upper portions of Bear Creek within Addicks Reservoir. Along and west of US 59 from Kingwood to

Sugar Land rainfall totals averaged 4.0-6.0 inches with totals generally less than 2.0 inches east of US 59. Another rainfall maximum of 7.0-9.0 inches fell in a small band from near Hunters Creek Village to just north of The Meadows.

Exceedance Probability – The highest short term rainfalls occurred over Addicks Reservoir and Buffalo Bayou. The maximum 30-min rainfall recorded was 2.9 inches at Addicks Dam which is near the 1% (100-yr) frequency. One hour (1-hr) rainfall totals of 4.2 to 4.8 inches was recorded over Addicks, upper Brays Bayou, and upper Buffalo Bayou which equates to over a 1% (100-yr) frequency. For the 6-hr to 24-hr time periods the rainfall totals over Addicks, upper Brays, middle and upper Buffalo, Cypress Creek, Spring Creek, and upper White Oak Bayou ranged from a 10% (10-yr) to 2% (50-yr) event.

The magnitude of rainfall over the central part of Addicks Reservoir especially upper Bear Creek for a 24-hr time period has not been experienced in this part of the county since detailed rainfall analysis collection began in the early 1980's. The last time similar rainfall occurred on upper Buffalo Bayou was in March of 1992 and this event averaged 1.0-2.0 inches higher than the 1992 rainfall. The areas heavily impacted in this event have largely escaped excessive rainfall events in the recent past including the floods of Tropical Storm Allison and Hurricane Ike.

Buffalo Bayou: Levels in the middle and upper portions of Buffalo Bayou were higher than the record levels set in March of 1992 from the West Belt downstream to around Voss. Above the West Belt levels were slightly lower than those of March of 1992. A record flow of 7,700 to 7,800 cfs occurred at the Piney Point USGS gage. Water surface levels along Buffalo Bayou from the 610 Loop to HWY 6 averaged between the 2% (50-yr) and 1% (100-yr) levels at each bridge location.

HOUSE FLOODING ESTIMATES

Extensive house flooding occurred throughout western and portions of central Harris County from channels overflowing their banks and internal drainage system being overwhelmed by the high intensity rainfall rates. The largest concentration of flooded homes occurred across the lower portions of the creeks feeding in Addicks Reservoir, along Buffalo Bayou and its tributaries, Brickhouse Gully, and the tributaries feeding into upper Brays Bayou. The majority of the houses flooded were outside the mapped 1% (100-yr) floodplains. Based on HCFCD records the April 28th event resulted in the 4th largest number of flooded homes. It should be noted that count verifications continue and the final number will likely be different from the current number.

June 2001 (TS Allison)	73,000
June 19, 2006	3,370
October 1994	3,248
April 28, 2009	**2,168**
October 2002	1,999

QUESTIONS

1. Has Soldiers Creek been cleaned since Hurricane Ike?

   Yes. HCFCD personnel have been to more than a few locations along Soldiers Creek (W141-00-00) since Hurricane Ike. HCFCD inspected the debris removal in April prior to the latest heavy rains and found the channel clear of Ike debris and other large blockages.

2. What is HCFCD policy on regular maintenance of Soldiers Creek?

   Routine maintenance consists of hand cutting from the upstream end to Marchmont. Other activities are selective clearing, removing snags, and debris removal. Right of way, where it exists, is narrow and access is very limited, especially downstream of Marchmont where the channel is in its natural state. We are evaluating this area for a selective clearing project however, access is a big issue.

3. When was the last time Soldiers Creek was cleaned?

   Routine maintenance recently began this season and the hand cutting crews have not made it to Soldiers Creek yet.

4. Residents reported that the water elevations on Buffalo Bayou rose over 16' in two hours (5:00 am to 7:00 am). They have question to why the bayou rose so fast.

   Buffalo Bayou rose quickly due to the intense rainfall that occurred over saturated ground over a wide region of the watershed between 1 am and 4 am.

5. Has Buffalo Bayou been cleaned since Hurricane Ike?
   Yes.

6. What is HCFCD policy on regular maintenance of Buffalo Bayou?

   Buffalo Bayou upstream of the west Sam Houston Tollway is known as Terry Hershey Park and is managed by Harris County Precinct 3. The following discussion pertains to Buffalo Bayou downstream of the tollway.

   HCFCD considers Buffalo Bayou to be a natural stream and thus does not perform routine mowing along its banks. Because there is very little public rights of way along the bayou and we do not have to routinely travel on the banks to mow or inspect the bayou, we do not repair erosion.

We do, however, perform debris removal from the bayou using boats. The bayou is traversed two times a year to deal with fallen trees and limbs that are blocking or have the potential to block the flow of water. This operation takes place twice a year once around February and again around September. The operation usually takes 4 to 6 weeks to complete.

7. When was the last time Buffalo Bayou was cleaned?

   The operation to remove debris last took place from January 8 to February 16, 2009.

8. Who controls Addicks Reservoir?

   Army Corps of Engineers, Galveston District.

9. Who has the say in controlling the dam and releasing water?

   Army Corps of Engineers.

10. Do they have to contact and tell downstream Communities that they are releasing water?

    Not to my knowledge, but this should be directed to the Corps, Mr. Richard Long at 281-497-0740.

Memorial Villages Area Drainage Challenges and HCFCD Partnership Projects

The items listed below are for background purposes only to generally describe conditions so flooding and drainage issues in the Villages can be put into proper context for further discussion.

1. The primary drainage issues with the Memorial Villages area are that there are very few large channels to receive water from the internal (street) drainage systems, the channels that are there have limited capacities, no defined sheet flow paths were designed in the neighborhoods when they were built and a lot of the houses that flood were built almost at ground level.

2. The projects that HCFCD participated in are part of a coordinated master plan HCFCD facilitated among the villages.

3. New subdivisions are designed to address sheet flow (above and beyond the 2-year rainfall frequency) with the overall street grading plan. In other words, sheet flow outlets are designed and constructed as part of the street grading.

4. It is usually not practical to retrofit older areas when there are no larger outfall channels nearby.

5. Oversized storm sewers are used when "normal" design (1- to 2-year rainfall frequencies) does not address existing house flooding under extreme storms due to sheet flow and ponding.

6. Most of the villages' drainage system is "normal" 1- to 2-year design.

7. HCFCD participated in the drainage cost for what was over-and-above a normal system.

8. We brought money – Villages constructed the projects.

9. HCFCD did not participate in other street paving, normal drainage, or utility costs.

10. Sizing the entire region's storm sewer system for extreme events (100-year) would be cost-prohibitive (construction and impact mitigation).

Project Listing:

1. Hedwig Village Drainage Project, Hunter's Branch
   W140-01-01-Y001
   Agreement Executed July 1997
   HCFCD share $2,100,000 ($2,000,000 for construction, $100,000 for right of way)
   Hedwig Village share $2,000,000

2. Memorial Drive Phase 1 Drainage Improvement Project

W141-00-00-Y004
January 2002
HCFCD $1,790,518
Hunters Creek Village $2,000,000

3. Soldiers Creek Relief Project
   W141-00-00-Y003
   February 2002
   HCFCD 5,750,000
   Piney Point Village, Hunters Creek Village $5,750,000

4. Timberwilde Outfall Project
   W100-00-00-Y014
   January 2005
   HCFCD $2,640,000
   Hunters Creek Village $2,860,200

5. Memorial Drive Phase 2 and Phase 3 Drainage Improvement Project
   W141-00-00-Y005
   February 2006
   HCFCD $1,265,000
   Hunters Creek Village $2,000,000

6. Soldiers Creek, Camelot Lane, Country Lane and Gawain Lane
   W141-00-00-00-Y006
   July 2007
   HCFCD $1,500,000
   Hunters Creek Village $4,300,000

7. Hilshire Village – Ridgeley Drive Drainage Improvements
   W140-04-00
   July 2008
   HCFCD $110,300

HCFCD Grand total: $15,155, 818.