

MEMORANDUM



9900 Northwest Freeway
Houston, TX 77092
713-684-4000

DATE: July 5, 2016

TO: HCFCF Flood Watch/Partners

FROM: Jeff Lindner
Meteorologist / Flood Watch Coordinator

RE: Immediate Report – Final
May 26-27, 2016 (Memorial Weekend) Storm and Flood Information

This is the second update and final report summarizing the major flooding from excessive rainfall on May 26th-27th over north and northwest Harris County, southern Montgomery County, and northern Waller County.

GENERAL FLOODING STATEMENT

Only six weeks after the historic and devastating April 2016 “Tax Day” flooding another significant rainfall event occurred over the north and northwestern parts of Harris County into Waller, Montgomery, and Washington Counties.

A strong upper level trough combined with above average moisture levels and favorable upper level wind patterns resulting in a round of slow moving excessive rainfall producing thunderstorms during the afternoon hours of the 26th into the overnight and early morning hours of the 27th. Thunderstorms developed in the early afternoon hours over the College Station area and drifted slowly southward into the Brenham area by mid afternoon. Portions of Washington County recorded over 12 inches of rainfall in a 3-hr period. This line of storms expanded and drifted in north Waller, southern Montgomery, and extreme northern Harris counties during the early evening hours producing extensive amounts of rainfall and rapid flash flooding. This line of storms trained west to east for much of the overnight hours before gradually weakening by sunrise on the 27th.

During the afternoon of the 27th a secondary line of thunderstorms producing excessive rainfall moved into Harris County from the north. This line of storms crossed into the county around 1:00 p.m. and exited southern Harris County after 8:00 p.m. Additional rainfall of 4.0-6.0 inches on top of 6.0-10.0 inches from the previous night led to additional significant run-off into already flooded creeks across northern Harris County.

A Flash Flood Emergency was issued at 2:25 a.m. on May 27th for extreme northern and northwest Harris County northwest into Waller, Montgomery, Grimes, Austin, and Washington Counties. This is the second issuance of a Flash Flood Emergency for a part of Harris County in a six week period and the third time in the period of one year.

A total of 11.79 inches of rainfall was recorded at the Brenham Airport ASOS site in a 6-hr period during the afternoon of the 26th which is very close to the 500-yr rainfall for that time period. A total of 16.33 inches fell in 12-hrs which exceeds the 500-yr for that time period by 1.63 inches.

Harris County was added to the federal disaster declaration (DR-4272) on June 30th for individual assistance. This is the fourth federal disaster declaration for Harris County in the last year: May 2015 (DR 4223), Halloween 2015 (DR 4245), Tax Day April 2016 (DR 4269), and May/June flooding 2016 (DR 4272).

MAY 26-27 RAINFALL

Duration – The heaviest rainfall occurred over northern Waller, southern Montgomery and Washington counties with the heaviest rainfall in Harris County generally confined to an area north of FM 1960. The majority of the rainfall occurred in a 12-hr period on the evening of the 26th into the morning of the 27th and during a secondary round of thunderstorms on the afternoon and evening of the 27th. Hourly rainfall rates during the evening of the 26th were impressive with Lake Conroe Dam recording 4.30 inches and Spring Creek at Kuykendahl 3.60 inches both in 1-hr.

Widespread 3-hr rainfall totals of 5.5-7.0 inches were recorded over southern and western Montgomery County including 7.2 inches on Lake Creek at Egypt and 6.3 inches on Bear Branch at FM 2978 in The Woodlands.

Total Amounts – Total rainfall amounts averaged 8.0-13.0 inches over northwest Harris County, northwest of a line from The Woodlands to Tomball to Waller. Rainfall amounts north of FM 1960 averaged 5.0-6.0 inches with the remainder of central and southern Harris County averaging 2.0-4.5 inches. There was a very strong rainfall gradient over northwest Harris County with a maximum total of 13.36 inches on Spring Creek near The Woodlands to only 3.88 inches in Greenspoint along Greens Bayou.

Rainfall amounts from the San Jacinto River Authority and The Woodlands rain gages indicated widespread rainfall totals of 10.0-12.0 inches over much of southern and southwestern Montgomery County in a 24-hr period. Totals of 14.0-15.0 inches fell over northern Waller County and these storm totals matched well with the ground truth gage readings in this area. This rainfall occurred across the Spring Creek and West Fork of the San Jacinto River.

The table below indicates maximum rainfall for Harris County gage locations

Duration	Max Rainfall (in)	Duration	Max Rainfall (in)
5-min	0.7	3-hr	6.2
15-min	1.4	6-hr	7.4
30-min	1.6	12-hr	8.1
1-hr	3.6	24-hr	13.4
2-hr	5.2	48-hr	13.4

Exceedance Probability – Rainfall for a 24-hr time period:

- Spring Creek: between the 2% (50-yr) and 1% (100-yr),
- Willow Creek: between the 10% (10-yr) and 4% (25-yr),
- Cypress Creek: between the 50% (2-yr) and 20% (5-yr),
- Little Cypress Creek: between the 20% (5-yr) and 4% (25-yr),
- West Fork of San Jacinto River: between the 4% (25-yr) and 1% (100-yr),

RAINFALL COMPARISON TO OCTOBER 1994/1998 and April 2016 Floods

The locations with the most rainfall during the May 26-27th event were also impacted during the 2016 Tax Day flood event six weeks prior. In fact, the corridor of maximum rainfall during the May 2016 event was only a few tens of miles north of the corridor of maximum rainfall during the April 2016 event.

While the point rainfalls listed below yield some comparison to previous historical events, a better comparison is with the use of Doppler radar to determine the area extent and intensity of rainfall within the upstream reaches of the Spring Creek and West Fork of the San Jacinto River watersheds in Montgomery, Grimes, and Waller Counties. The comparison of the estimated rainfall for the October 1994 flood event and the May 2016 flood event shows similar location of maximum rainfall totals over southwestern and western Montgomery County into southern Grimes and northern Waller Counties. The May 2016 event shows the maximum rainfall a little further west in Washington County with the October 1994 event maximum over southwest and western Montgomery County. Rainfall in October 1994 was also higher with a large area of 15.0-20.0 inches over western Montgomery County compared to 12.0-15.0 inches for the May 2016 event. Both of these events heavily impacted the Spring Creek and West Fork of the San Jacinto River watersheds.

The April 2016 flood event was focused slightly further south from south-central Waller County into northwest and west-central Harris County. Excessive rainfall from the April 2016 event was mainly south of Spring Creek and the West Fork of the San Jacinto River watersheds.

The following rainfall comparison is for the 24-hr time period in inches

Location	May 16	Apr 16	Oct 98	Nov 98	Oct 94
Mound Creek at Mathis	7.0	17.6	8.7	3.3	15.0
Cypress Creek at Katy Hockley	6.7	16.5	7.9	3.5	4.4
Spring Creek at SH 249	11.8	10.1	9.3	7.8	N/A
Spring Creek at FM 2978	12.4	11.0	N/A	N/A	N/A
Spring Creek at Kuykendahl	13.4	10.5	N/A	N/A	N/A
Spring Creek at I-45	8.0	9.4	7.0	6.1	5.9
Willow Creek at SH 249	9.4	12.6	7.9	7.2	6.3
West Fork San Jacinto at Kingwood	11.3	7.3	N/A	N/A	N/A
East Fork San Jacinto at FM 1485	8.1	6.5	13.3	8.2	10.9

COMPARISON OF 2015 and 2016 HARRIS COUNTY MAJOR RAINFALL EVENTS

In a 12 month period Harris County suffered six major rainfall events leading to extensive flooding over various portions of the county. Reliable rainfall records across Harris County since the early 1980's indicate the May 2015 to May 2016 time period as one of the most active periods of heavy rainfall and flooding in the last 35 years. Three major floods occurred in the fall of 1998: Tropical Storm Frances (September), October, and November and three major floods occurred during a one week period as Tropical Storm Allison meandered over the region (June 5, June 7, and June 8/9, 2001), but the onslaught of multiple excessive rainfall and flooding events during the May 2015 to May 2016 time period is unprecedented across Harris County in modern times.

The table below compares the rainfall intensities over time for the Memorial Day (May 25-26, 2015), October 24-25, 2015, Halloween (October 31, 2015), April 16-18, 2016 (Tax Day) and May 26-27, 2016 rainfall events. The amounts listed are the maximum totals for that time period across Harris County.

Date	15-min	1-hr	3-hr	6-hr	12-hr	24-hr
May 12-13, 2015	1.2	3.4	6.2	7.8	8.2	8.4
May 25-16, 2015	2.1	4.8	8.3	10.1	11.0	11.0
Oct. 24-25, 2015	1.0	2.7	4.2	6.0	8.4	10.4
Oct. 31, 2016	1.6	4.1	7.4	8.5	11.8	11.9
April 17-18, 2016	2.2	4.7	8.3	13.9	16.7	17.4
May 26-27, 2016	1.4	3.6	6.2	7.4	8.1	13.4

The Memorial Day 2015, Halloween 2015, and Tax Day April 2016 events all exceeded the 3-hr, 6-hr, and 12-hr 1% (100-yr) rainfall frequency for Harris County, while the May 26-27, 2016 event exceeded the 1% (100-yr) rainfall frequency for the 24-hr period. IT should be noted that the maximum rainfall associated with the Tax Day April 2016 event exceeded the 1% (100-yr) rainfall frequency by over 4.0 inches The May 12-13, 2015 and October 24-25, 2015 events were generally less than 1% (100-yr) events for all the time periods with the May 12-13, 2015 event averaging between a 2% (50-yr) and 1% (100-yr) and the October 24-25, 2015 event averaging between a 4% (25-yr) and 2% (50-yr).

CHANNEL FLOODING

Major overbank and structural flooding occurred along the following channels

- Spring Creek
- Willow Creek
- Little Cypress Creek
- Cypress Creek
- West Fork of San Jacinto River
- East Fork of San Jacinto River
- San Jacinto River below Lake Houston

Spring Creek

Water levels along Spring Creek averaged between the 1% (100-yr) and .2% (500-yr) level with significant flooding occurring along the entire channel and tributaries especially on the Montgomery County side of the creek. High water marks indicate that the May 26-27th event was the most significant flooding along Spring Creek since October 1994. The May 2016 event resulted in the second highest water levels recorded along the creek since records began in the late 1970's, however, the October 1994 flood remains the flood of record along the creek at nearly all locations. Impressive vegetative damage and erosion occurred along the channel with many trees toppled and up-rooted by the flow of the water. Significant structural damage occurred on the Montgomery County side of the creek where high velocity flows knocked over brick walls and chain link fences. East of Gosling Rd., homes deeply submerged along the creek in Montgomery County suffered extensive structural damage in the Timberlake subdivision. Also, low lying bridges crossing the channel sustained damage and significant scour along the lower portions of the channel resulted in damage to a gas pipeline crossing downstream of Riley Fuzzel Rd. The pipeline did not rupture and no gas spilled into the creek.

A review of the USGS stream flow database dating back to 1929 at Spring Creek and I-45 indicates that the 58,400 cfs at the peak on May 28th is the second highest flow rate ever recorded at this location. The table below lists the top 5 highest flow rates for Spring Creek at I-45.

Flooding Date	Flow Rate (cfs)
Oct 18, 1994	78,800
May 28, 2015	58,400
May 30, 1929	48,700
Nov 25, 1940	42,700
Aug 30, 1945	31,100

Willow Creek

Water levels along Willow Creek averaged near or just above the 10% (10-yr) elevations along the entire channel. Water levels were 1.0-2.0 ft. lower than the April 2016 Tax Day flood and equal or higher than the October 1994 flooding especially on the middle and upper end of the watershed. This was the third flooding event along Willow Creek in a three month period (March 10, April 18, May 27).

Little Cypress Creek

Water levels along Little Cypress Creek were near the 1% (100-yr) elevations from the confluence with Cypress Creek upstream to Spring Cypress. From upstream of Spring Cypress to the headwaters, water levels were at or above the .2% (500-yr) elevations. Water levels averaged 1.0-2.0 ft lower than the April 2016 Tax Day flood and were very similar to the July 2012 flood. This was the third flood event along Little Cypress Creek in a three month period (March 10, April 18, May 27).

Cypress Creek

Water levels along Cypress Creek were generally near or below the 10% (10-yr) elevations along the entire channel and were, on average, several feet lower than the April 2016 Tax Day flood. Water levels were similar to the July 2012 flood along much of the channel. Water levels exceeded both the April 2016 and July 2012 floods from Cypresswood (north of BUSH IAH) to the confluence with Spring Creek due to backwater flooding from extremely high flows in Spring Creek.

West Fork of the San Jacinto River

Water levels along the West Fork of the San Jacinto River averaged between 10% (10-yr) and 2% (50-yr) levels along the entire channel from west of US 59 to Lake Houston. This was the most significant flood event along the West Fork of the San Jacinto River since the record flooding in October 1994. Water levels were higher than floods in October and November 1998, but 3.0-5.0 ft lower than October 1994. Significant flooding occurred in portions of Forest Cove and Kingwood that have not experienced significant flooding since October 1994.

East Fork of the San Jacinto River

Water levels along the East Fork of the San Jacinto River averaged between 2% (50-yr) and 1% (100-yr) and were the third highest water levels recorded since the late 1970's. Higher water levels occurred in October 1994 and November 1998.

San Jacinto River below Lake Houston

Water levels along the lower San Jacinto River below Lake Houston averaged between 10% (10-yr) and 2% (50-yr) levels. The October 1994 flood remains the record along this portion of the river by several feet, but this flood was the second highest surpassing both the October and November 1998 floods and flooding associated with Hurricane Ike's storm surge at Rio Villa and HWY 90.

LAKE CONROE

Lake Conroe rose to a peak elevation of 204.51 ft on May 28th, which is the 3rd highest pool elevation recorded since the creation of the lake. Higher pool elevations were recorded in October 1994 (205.88 ft) and in May 1983 (204.66 ft). A peak release rate of 22,245 cfs occurred at 12:24 a.m. on the 28th from the Lake Conroe Dam. It is estimated that at least 90,000 cfs flowed into Lake Conroe at the peak of the inflows and the San Jacinto River Authority withheld as much of the inflow as possible, at times only having 3-4 inches of freeboard on their floodgates.

Significant amounts of run-off occurred below Lake Conroe from Lake Creek, Spring Creek, and Cypress Creek and resulted in much of the flooding along the West Fork of the San Jacinto River. An estimated peak flow of 132,700 cfs passed through the West Fork of the San Jacinto River at US 59 (Humble). Of the 132,700 cfs, 84% was from Lake Creek, Spring Creek, and Cypress Creek with 16% from the Lake Conroe

releases. Without the controlled releases from Lake Conroe, flooding along the West Fork of the San Jacinto River would have been significantly worse.

The water level crested at the Lake Houston Spillway at 47.82 ft during the afternoon of the 29th with an estimated flow of 150,000 cfs over the top of the spillway which would fill the Houston Astrodome every 5 minutes.

ADDICKS AND BARKER RESERVOIRS

Pools of both reservoirs were elevated from the excessive rainfall and record elevations in April 2016, although Corps of Engineer's releases had significantly lowered both pools from the middle of April to the onset of the May 26-27th event. Rainfall over Addicks reservoir averaged 3.5-4.5 inches and over Barker Reservoir 2.0-3.0 inches. This resulted in new reservoir rises, especially in Addicks. The pool of Addicks Reservoir began to cover portions of SH 6 and Eldridge Pkwy during the morning of the 28th and resulted in the total closure of both roadways. Some of the lanes of SH 6 were able to be re-opened during the afternoon of the 29th as inflows slowed and releases from the dam commenced.

Less rain over Barker Reservoir and a lower pool elevation compared to Westheimer Pkwy resulted in no flooding of the roadway.

CYPRESS CREEK OVERFLOW

For the second time in a six week period excessive rainfall draining from Waller County resulted in overland flow out of the Cypress Creek watershed into the Addicks watershed. Overflow began late on May 28th and continued for much of the 29th before subsiding on the 30th. Water levels were significantly lower than those which occurred in April 2016, but large areas of northwest Harris County were inundated with flow moving into the Bear Creek watershed and eventually Addicks Reservoir. On average, water levels in the Cypress Creek overflow area were between 2.0-3.0 ft lower than the 2016 April flooding.

HOUSE FLOODING ESTIMATES

House flooding was reported across portions of northern Harris County and southern Montgomery County as well as across much of the San Jacinto River basin. A total of 1270 homes flooded in Harris, Montgomery, and Waller Counties along with 34 businesses. In Harris County a total of 425 homes and 22 businesses flooded mainly in the San Jacinto River, Spring Creek, Willow Creek, Cypress and Little Cypress Creek watersheds. Along Spring Creek and its major tributaries in Montgomery County a total of 780 homes and 12 businesses flooded along with 2 apartment complexes with the majority of the flooding occurring east of SH 249 and the southern portions of The Woodlands. In Waller County a total of 65 homes flooded in the headwaters of Spring and Cypress Creeks. Additional homes flooded in Waller County along the Brazos River and those homes were removed from the total Waller County count since they fell outside the watersheds that drain into Harris County.

Watershed	House Flooding Estimates
San Jacinto River	190
Cypress Creek	55
Spring Creek	40
Willow Creek	130
Little Cypress Creek	45
Luce Bayou	5

***Total* 465**

Jurisdiction	House Flooding Estimates
Unincorporated Harris County	245
Houston	133
Tomball	71
Humble	16

***Total* 465**

House flooding counts above include counts from damage assessment teams, FEMA claim reports, HCFCD phone bank, and online reports via readyharris.org with duplicates being removed.

HIGH WATER MARKS

HCFCD obtained 86 high water marks along the following channels: Spring Creek, Willow Creek, Little Cypress Creek, Cedar Bayou, entire San Jacinto basin and its tributaries and the Cypress Creek overflow zone. All of these marks were completed in a 2 day period from Tuesday the 31st to Wednesday June 1st prior to the onset of additional heavy rainfall on June 2nd.

HARRIS COUNTY FLOOD CONTROL DISTRICT ACTIONS

- The HCFCD Flood Watch team was activated from 5:30 p.m. May 26th until 6:00 p.m. May 30th
- HCFCD conducted approximately 30 media interviews
- Three HCFCD Flood Warning System gages were inundated by the extreme flows and destroyed during the flooding:
 - Spring Creek at Hegar Rd (second time in six weeks)
 - West Fork San Jacinto at Kingwood Country Club (second time in six weeks)
 - San Jacinto River at Rio Villa.

PROJECTS THAT HELPED REDUCE HOUSE FLOODING

A few capital projects and maintenance of the channels within Harris County helped reduce the risk of flooding and ensure the systems operated as intended. Regional detention basins in Cypress Creek, Little Cypress Creek, and Willow Creek stored a significant amount of stormwater.

Past voluntary home buyouts throughout the county of homes hopelessly deep in the floodplain were effective for this storm event. Through a partnership with FEMA, more than 2,000 homes were acquired, the residents moved to higher ground, and the homes demolished. The sites are kept undeveloped and are useful as open space and natural floodplain functions. In addition, the HCFCD has acquired about 1,000 additional homes. In the watersheds listed below, approximately 390 homes would have flooded during this event had the HCFCD and FEMA not purchased and removed them.

Watershed	# of Homes
Cypress Creek	135
San Jacinto River	245
Willow Creek	1
Little Cypress Creek	7
Spring Creek	2

Total **390**

HARRIS COUNTY FLOOD CONTROL DISTRICT FACILITIES CONDITIONS

The HCFCD channels and detention basins functioned as designed and helped to reduce flood levels. Where rainfall amounts were highest in north and northwest Harris County and adjacent Waller and Montgomery counties, the natural main channels were overwhelmed. Channels described as “natural” are more heavily treed and flood waters up-rooted many trees and scoured the channel stream beds.

The channels and detention basins in north and northwest Harris County had previously been impacted by the historic Tax Day flood event six weeks earlier. Numerous slope failures, bank erosion, outfall pipe damages, fallen trees and other storm-related problems were identified in many of the channels. Clearing and debris removal had begun on Little Cypress Creek when this event occurred. Extensive debris in Little Cypress Creek is producing quantities of debris from downed trees that is surpassing amounts removed after Hurricane Ike in 2008. As work is completed, crews will move to Cypress Creek, also impacted by this flood event and the Tax Day flooding.

The first HCFCD mowing cycle of 2016 began on May 9th and was approximately 25 percent complete prior to this event. The second mowing cycle is scheduled to start July 25th.

Rainfall Intensity Report
5-24-16 10:00 AM through 5-28-16 10:00 AM

Clear Creek, A100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
100	0.3	0.7	1.1	1.4	1.4	2.0	2.1	2.1	2.3	2.3	A100 Clear Lake 2nd Outlet @ SH 146
105	0.3	0.7	1.0	1.5	2.3	3.2	3.5	3.5	3.5	3.5	Mary's Creek @ Melodywood Drive
110	0.3	0.6	0.9	1.0	1.2	2.0	2.1	2.1	2.3	2.3	A100 Clear Creek @ I-45
115	0.3	0.7	1.1	1.4	2.0	2.8	3.1	3.1	3.1	3.1	Cowart Creek @ Baker Road
120	0.3	0.6	1.0	1.2	1.6	2.3	2.8	2.8	2.8	2.8	A100 Clear Creek @ FM 528
125	0.2	0.5	0.8	1.0	1.5	2.2	2.5	2.5	2.5	2.5	Chigger Creek @ Windsong Lane
130	0.3	0.6	1.2	1.3	1.8	2.4	3.0	3.1	3.1	3.1	A100 Clear Creek @ Bay Area Boulevard
135	0.3	0.8	1.1	1.4	2.2	3.0	3.3	3.3	3.3	3.3	A100 Clear Creek @ FM 2351
140	0.3	0.8	1.2	1.7	2.7	3.5	3.8	3.8	3.8	3.8	A119 Turkey Creek @ FM 1959
150	0.2	0.6	0.9	1.4	2.4	3.4	3.5	3.5	3.6	3.6	A100 Clear Creek @ Country Club Drive
160	0.2	0.6	1.1	1.9	2.8	3.8	4.0	4.0	4.0	4.0	A120 Beamer Ditch @ Hughes Road
170	0.3	0.6	0.8	1.0	1.3	1.8	2.2	2.2	2.2	2.2	A100 Clear Creek @ Nassau Bay
180	0.2	0.5	1.0	1.3	2.3	2.9	3.0	3.0	3.0	3.0	A100 Clear Creek @ Mykawa Road
190	0.3	0.8	1.3	1.6	2.2	2.4	2.4	2.4	2.5	2.5	A100 Clear Creek @ SH 288
200	0.3	0.7	1.0	1.3	2.0	2.3	2.8	2.8	2.9	2.9	A104 Taylor Lake @ Nasa Road 1

Armand Bayou, B100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
210	0.2	0.6	0.7	0.9	1.4	1.7	2.2	2.2	2.2	2.2	B100 Armand Bayou @ Pasadena Lake (Nasa Road 1)
220	0.3	0.8	1.3	1.7	3.2	3.9	4.6	4.6	4.7	4.7	B100 Armand Bayou @ Genoa-Red Bluff Road
230	0.2	0.7	1.1	1.5	2.6	3.4	4.0	4.0	4.0	4.0	B106 Big Island Slough @ Fairmont Parkway
240	0.3	0.7	1.1	1.7	2.7	3.4	3.6	3.6	3.6	3.6	B100 Armand Bayou @ Beltway 8
250	0.4	0.8	1.1	1.4	2.5	3.3	3.9	3.9	3.9	3.9	B104 Horsepen Creek @ Bay Area Boulevard
270	0.2	0.7	1.2	1.6	3.0	3.8	4.3	4.3	4.4	4.4	B112 Willow Spring Bayou @ Fairmont Parkway

Sims Bayou, C100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
310	0.2	0.6	1.1	1.4	2.5	3.0	3.1	3.1	3.1	3.1	C106 Berry Bayou @ Nevada Avenue
320	0.2	0.5	0.6	1.0	1.6	2.1	2.3	2.3	2.3	2.3	C106 Berry Bayou @ Forest Oaks Boulevard
340	0.2	0.5	0.8	1.5	1.9	2.3	2.5	2.5	2.6	2.6	C100 Sims Bayou @ Telephone Road
360	0.3	0.6	1.0	1.4	1.8	2.2	2.3	2.3	2.4	2.4	C100 Sims Bayou @ Martin Luther King Road
370	0.3	0.8	1.4	1.7	2.3	2.8	2.9	2.9	3.0	3.0	C100 Sims Bayou @ SH 288
380	0.3	0.7	1.2	1.5	2.3	2.9	3.0	3.0	3.0	3.0	C100 Sims Bayou @ Hiram-Clarke Road

Rainfall Intensity Report
5-24-16 10:00 AM through 5-28-16 10:00 AM

Brays Bayou, D100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1020	0.3	0.6	0.9	1.2	2.0	2.9	3.1	3.1	3.3	3.3	NRG Park
400	0.3	0.6	0.9	1.2	2.0	2.6	2.9	2.9	3.0	3.0	D109 Harris Gully @ South McGregor Way
410	0.2	0.5	0.8	1.0	1.8	2.1	2.3	2.3	2.6	2.6	D100 Brays Bayou @ Lawndale Street
420	0.3	0.6	0.9	1.3	2.3	3.2	3.4	3.4	3.5	3.5	D100 Brays Bayou @ South Main Street
430	0.2	0.6	1.0	1.3	2.1	2.8	3.0	3.0	3.2	3.2	D100 Brays Bayou @ Stella Link Road
435	0.3	0.8	1.1	1.5	2.4	3.2	3.4	3.4	3.6	3.6	D112 Willow Water Hole @ Willowbend Boulevard
440	0.2	0.6	0.9	1.3	2.1	2.8	2.9	2.9	3.0	3.0	D100 Brays Bayou @ Rice Avenue
445	0.3	0.7	1.2	1.5	2.4	3.1	3.2	3.2	3.2	3.3	D112 Willow Water Hole @ Landsdowne Drive
460	0.2	0.5	0.6	0.9	1.5	2.0	2.1	2.1	2.2	2.2	D100 Brays Bayou @ Gessner Road
465	0.2	0.4	0.7	1.0	1.5	2.0	2.0	2.0	2.4	2.4	D100 Brays Bayou @ Beltway 8
470	0.2	0.4	0.7	1.0	1.3	1.6	1.6	1.6	1.9	1.9	D100 Brays Bayou @ Belle Park Drive
475	0.2	0.4	0.7	1.1	1.4	1.8	1.8	1.8	2.3	2.3	D100 Brays Bayou @ Bellaire Boulevard
480	0.2	0.4	0.6	1.0	1.3	1.8	1.9	1.9	2.0	2.0	D118 Keegans Bayou @ Roark Road
485	0.2	0.4	0.7	0.9	1.4	1.6	1.6	1.6	1.8	1.8	D100 Brays Bayou @ SH 6
490	0.1	0.3	0.5	0.8	1.0	1.4	1.4	1.4	1.5	1.5	D118 Keegans Bayou @ Keegan Road
495	0.2	0.4	0.6	0.8	1.3	1.7	1.7	1.7	1.9	1.9	D118 Keegans Bayou @ Rocky Valley

White Oak Bayou, E100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
510	0.2	0.4	0.6	1.2	1.8	1.9	2.0	2.1	2.7	2.7	Harris County Flood Control @ Brookhollow
520	0.2	0.5	0.9	1.7	2.7	3.0	3.4	3.4	3.7	3.8	E100 White Oak Bayou @ Heights Boulevard
530	0.2	0.4	0.6	1.1	1.6	1.8	2.0	2.0	2.8	2.8	E100 White Oak Bayou @ Ella Boulevard
535	0.3	0.7	0.8	1.0	1.8	2.0	2.1	2.1	3.3	3.3	E100 White Oak Bayou @ Pinemont Drive
540	0.4	0.8	1.2	1.3	1.6	1.9	2.1	3.0	3.8	3.8	E100 White Oak Bayou @ Alabonson Road
545	0.2	0.7	1.1	1.4	2.1	2.2	2.4	2.7	3.2	3.2	E100 White Oak Bayou @ Fairbanks North Houston Road
550	0.4	0.9	1.0	1.5	1.9	2.1	2.2	2.9	3.4	3.4	E100 White Oak Bayou @ Lakeview Drive
555	0.4	1.0	1.1	1.7	2.2	2.7	2.8	3.5	4.5	4.5	E100 White Oak Bayou @ Jones Road
560	0.3	0.6	0.9	1.5	2.3	2.7	3.0	3.0	3.4	3.4	E101 Little White Oak Bayou @ Trimble Street
570	0.4	0.8	1.0	1.2	1.8	2.2	2.6	2.6	3.8	3.8	E101 Little White Oak Bayou @ Tidwell Road
575	0.3	0.7	0.9	0.9	1.5	1.8	1.9	2.0	3.2	3.2	E100 White Oak Bayou @ Tidwell Road
580	0.3	0.8	0.9	1.1	1.8	2.0	2.1	2.2	3.4	3.4	E115 Brickhouse Gully @ Costa Rica Road
585	0.4	0.8	1.3	1.3	1.8	2.2	2.4	3.2	4.2	4.2	E121 Vogel Creek @ Victory Drive
590	0.4	0.9	1.4	1.4	1.4	1.6	1.7	2.7	3.4	3.4	E117 Cole Creek @ Deihl Road
595	0.5	0.9	1.2	1.2	1.6	1.9	2.0	3.0	3.6	3.6	E121 Vogel Creek @ Gulf Bank Road

Little Cedar Bayou, F216											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
610	0.3	0.8	1.1	1.4	2.5	3.0	3.5	3.5	3.7	3.7	A104 Taylor's Bayou @ Shoreacres Boulevard
620	0.3	0.7	1.2	1.8	3.4	4.2	4.6	4.6	4.7	4.7	F216 Little Cedar Bayou @ 8th Street
640	0.3	0.7	1.1	1.6	2.4	3.2	3.6	3.7	3.8	3.8	F101 Lateral @ Sens Road

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San Jacinto River, G103											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
710	0.2	0.6	1.0	1.3	2.0	2.5	2.9	3.0	3.2	3.3	G103 San Jacinto River @ Banana Bend Street
720	0.4	1.0	1.6	2.3	2.8	3.4	3.9	3.9	4.4	4.4	G103 San Jacinto River @ US 90
750	0.3	0.5	0.8	1.4	2.2	2.4	2.6	2.8	4.5	4.6	G103 Lake Houston Dam Spillway
755	0.3	0.8	1.2	1.6	2.6	3.6	4.5	7.8	8.6	11.3	G103 San Jacinto River @ Kingwood Country Club
760	0.5	0.7	1.0	1.6	2.6	3.0	3.8	3.9	4.0	4.0	G103 San Jacinto River @ US 59
790	0.4	1.0	1.5	2.0	2.8	3.1	4.2	4.8	8.1	8.1	G103 East Fork San Jacinto @ FM 1485

Hunting Bayou, H100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
820	0.2	0.6	0.9	1.2	2.0	2.3	2.5	2.5	3.2	3.2	H100 Hunting Bayou @ I-10
830	0.2	0.4	0.7	1.1	1.3	1.8	2.1	2.1	2.8	2.8	H100 Hunting Bayou @ Loop 610 East
840	0.3	0.7	0.9	1.4	2.0	2.4	2.7	2.7	3.4	3.4	H100 Hunting Bayou @ Lockwood Drive

Vince Bayou, I100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
920	0.2	0.4	0.8	0.9	1.0	1.4	1.6	1.6	1.6	1.6	I100 Vince Bayou @ West Ellaine Down Stream
940	0.2	0.5	0.8	1.2	2.0	2.3	2.6	2.7	2.7	2.7	I101 Little Vince Bayou @ Jackson Avenue

Spring Creek, J100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1040	0.6	1.4	2.1	3.0	4.2	5.1	6.4	7.1	12.4	12.4	J100 Spring Creek @ FM 2978
1050	0.4	1.1	1.3	1.7	3.1	3.9	4.3	4.7	8.0	8.1	J100 Spring Creek @ I-45
1060	0.6	1.4	2.4	3.6	5.2	6.2	7.4	8.1	13.4	13.4	J100 Spring Creek @ Kuykendahl Road
1070	0.5	1.3	2.0	2.4	4.0	5.0	5.6	6.4	11.8	11.8	J100 Spring Creek @ SH 249
1090	0.7	1.4	2.0	2.9	3.6	5.4	NA	NA	NA	NA	J100 Spring Creek @ Hegar Road- Gage Destroyed

Cypress Creek, K100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1110	0.3	0.7	1.1	2.0	3.1	3.3	3.6	3.6	5.1	5.1	K100 Cypress Creek @ Cypresswood Drive
1115	0.4	0.8	1.3	1.9	2.8	3.1	3.3	3.6	5.4	5.4	K600 Cypress Creek @ Inverness Forest
1120	0.3	0.8	1.2	2.0	2.8	3.2	3.6	3.9	6.4	6.5	K100 Cypress Creek @ I-45
1130	0.3	0.4	0.8	1.4	2.2	2.8	3.2	3.8	5.5	5.5	K100 Cypress Creek @ Kuykendahl Road
1140	0.3	0.6	1.0	1.8	2.6	3.1	3.6	3.9	5.8	5.8	K100 Cypress Creek @ Stuebner-Airline Road
1150	0.4	0.8	1.5	2.5	3.5	3.8	4.2	4.6	6.0	6.0	K100 Cypress Creek @ SH 249
1160	0.3	0.8	1.5	2.7	3.8	4.2	4.4	4.9	6.2	6.2	K100 Cypress Creek @ Grant Road
1165	0.4	0.9	1.6	2.6	3.4	3.8	4.1	4.5	5.9	5.9	K100 Cypress Creek @ Eldridge Parkway N.
1170	0.3	0.9	1.4	2.3	3.4	3.7	3.9	4.5	5.7	5.8	K100 Cypress Creek @ Huffmeister Road
1180	0.4	0.9	1.3	2.1	3.4	3.7	4.0	4.7	6.7	6.8	K100 Cypress Creek @ Katy-Hockley Road
1185	0.4	0.7	1.1	1.5	2.6	3.0	3.2	3.6	4.7	4.8	K100 Cypress creek @ Sharp Road
1190	0.4	0.8	1.1	1.4	2.4	3.1	3.6	4.5	7.1	7.2	K166 Little Mound Creek @ Mathis Road
1210	0.3	0.8	1.3	2.4	3.3	3.6	3.8	4.6	6.0	6.0	L100 Little Cypress Creek @ Kluge Road
1220	0.5	1.0	1.2	2.2	3.1	3.3	3.7	4.4	6.8	6.8	L100 Little Cypress Creek @ Cypress Rosehill Road
1230	0.4	1.0	1.4	2.3	4.1	4.8	5.1	6.0	9.1	9.1	L100 Little Cypress Creek @ Becker Road

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Willow Creek, M100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1320.0	0.4	0.9	1.4	2.4	3.5	4.6	5.0	6.0	9.3	9.3	M100 Willow Creek @ Kuykendahl Road
1340.0	0.4	1.0	1.7	2.9	3.8	4.6	5.0	5.9	9.4	9.4	M100 Willow Creek @ SH 249

Carpenters Bayou, N100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1420.0	0.2	0.4	0.7	1.1	1.7	2.1	2.4	2.4	2.6	2.6	N100 Carpenters Bayou @ I-10
1440.0	0.2	0.4	0.6	0.9	1.5	1.9	2.4	2.4	2.8	2.9	N100 Carpenters Bayou @ Wallisville Road
1460.0	0.2	0.6	0.9	1.3	1.9	2.4	2.8	2.9	4.0	4.0	N100 Carpenters Bayou @ US 90

Goose Creek, O100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1520.0	0.2	0.5	0.8	1.4	2.4	2.9	3.2	3.2	3.5	3.5	O100 Goose Creek @ SH 146
1540.0	0.2	0.5	0.8	1.2	2.0	2.6	2.8	2.9	3.4	3.4	O100 Goose Creek @ Baker Road

Greens Bayou, P100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1600.0	0.4	0.7	1.0	1.8	2.8	3.2	3.4	3.5	5.0	5.0	P100 Greens Bayou @ Mount Houston Parkway
1610.0	0.2	0.4	0.6	1.0	1.6	2.0	2.3	2.3	2.7	2.7	P100 Greens Bayou @ Normandy Street
1620.0	0.2	0.6	0.8	1.2	1.8	2.2	2.6	2.6	3.7	3.8	P100 Greens Bayou @ Ley Road
1630.0	0.4	0.6	1.1	2.0	2.8	3.2	3.4	3.7	5.4	5.4	P130 Garners Bayou @ Beltway 8
1640.0	0.3	0.7	1.0	1.6	2.3	2.7	3.0	3.0	4.4	4.4	P100 Greens Bayou @ US 59
1645.0	0.3	0.6	1.0	1.8	2.4	2.8	3.0	3.3	4.7	4.7	P100 Greens Bayou @ Beltway 8
1650.0	0.3	0.6	0.9	1.3	2.0	2.5	2.8	3.3	5.0	5.1	P130 Garners Bayou @ Rankin Road
1660.0	0.3	0.6	1.0	1.9	2.5	2.8	3.0	3.1	3.8	3.9	P100 Greens Bayou @ Knobcrest Drive
1665.0	0.3	0.7	1.1	2.2	2.4	2.6	2.9	3.4	4.3	4.3	P100 Greens Bayou @ Bammel N Houston Road
1670.0	0.3	0.6	1.0	1.6	1.9	2.2	2.5	2.9	3.7	3.7	P100 Greens Bayou @ Cutten Road
1685.0	0.3	0.6	0.8	1.4	2.2	2.5	3.0	3.2	4.2	4.2	P100 Greens Bayou @ Tidwell Road
1695.0	0.2	0.6	0.8	1.4	2.0	2.4	2.6	2.9	4.1	4.1	P138 @ Aldine Westfield Road

Halls Bayou, P118											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1675.0	0.2	0.6	0.9	1.4	2.1	2.6	3.0	3.0	3.8	3.9	P118 Halls Bayou @ Tidwell Road
1680.0	0.3	0.7	1.0	1.6	2.4	2.8	3.2	3.2	4.1	4.1	P118 Halls Bayou @ Jensen Drive
1690.0	0.2	0.6	0.9	1.3	2.0	2.5	2.7	3.0	3.9	3.9	P118 Halls Bayou @ Airline Drive

Cedar Bayou, Q100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1720.0	0.2	0.6	0.9	1.3	2.3	2.9	3.4	3.5	4.1	4.1	Q100 Cedar Bayou @ SH 146
1730.0	0.2	0.6	0.9	1.3	2.2	2.9	3.1	3.1	4.3	4.3	Q100 Cedar Bayou @ FM 1942
1740.0	0.4	1.0	1.8	2.7	3.7	3.8	4.2	4.7	6.7	6.7	Q100 Cedar Bayou @ US 90

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Jackson Bayou, R100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1840.0	0.3	0.7	1.2	2.0	2.6	3.1	3.5	3.5	4.6	4.6	R102 Gum Gully @ Diamond Head Boulevard

Luce Bayou, S100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1940.0	0.3	0.8	1.2	1.9	2.9	3.1	3.5	4.0	7.4	7.4	S100 Luce Bayou @ FM 2100

Barker Reservoir, T100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
2010.0	0.2	0.4	0.7	1.3	2.0	2.1	2.2	2.2	2.8	2.8	Barker Dam
2020.0	0.2	0.5	0.8	1.4	2.1	2.3	2.3	2.3	2.7	2.8	T101 Mason Creek @ Prince Creek Drive
2040.0	0.3	0.7	1.2	1.6	2.2	2.5	2.5	2.6	3.0	3.0	T100 Buffalo Bayou @ US 90

Addicks Reservoir, U100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
2110.0	0.2	0.4	0.7	1.3	1.9	2.1	2.2	2.2	2.7	2.7	Addicks Dam
2120.0	0.4	0.8	1.0	1.6	2.3	2.7	2.8	3.2	4.0	4.0	U100 Langham Creek @ West Little York Road
2130.0	0.4	0.6	1.2	1.6	2.2	2.6	2.8	3.0	3.8	3.8	U106 Horsepen @ Trailside Drive
2140.0	0.5	0.9	1.4	2.0	2.6	2.9	3.1	3.7	4.2	4.3	U100 Langham Creek @ Longenbaugh Road
2150.0	0.3	0.5	0.8	1.3	1.9	2.1	2.2	2.2	3.0	3.0	U101 South Mayde @ Greenhouse Road
2160.0	0.4	0.7	0.8	1.4	2.0	2.4	2.5	2.5	3.4	3.5	U102 Bear Creek @ Clay Road
2170.0	0.4	0.8	0.9	1.2	1.8	2.1	2.1	2.4	3.2	3.2	U101 South Mayde @ Morton Road
2180.0	0.6	1.0	1.1	1.6	2.2	2.5	2.8	3.4	4.1	4.1	U102 Bear Creek @ FM 529
2190.0	0.7	0.9	1.1	1.8	2.2	2.3	2.4	3.1	3.5	3.5	U101 South Mayde Creek @ Peek Road

Buffalo Bayou, W100											
Sensor ID	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day	Site
1000.0	0.2	0.5	0.7	1.2	1.8	2.1	2.2	2.2	3.0	3.0	Houston Transtar
2210.0	0.2	0.6	0.8	0.9	1.8	2.1	2.3	2.3	2.7	2.7	W100 Buffalo Bayou @ Turning Basin
2220.0	0.3	0.5	0.9	1.4	2.2	2.8	3.1	3.1	3.2	3.2	W100 Buffalo Bayou @ Milam Street
2240.0	0.2	0.5	0.9	1.4	2.2	2.7	3.1	3.1	3.3	3.3	W100 Buffalo Bayou @ Shepherd Drive
2250.0	0.4	0.9	1.0	1.2	1.8	2.0	2.0	2.1	3.2	3.2	W140 Spring Branch @ Bingle Road
2255.0	0.4	0.8	0.9	1.2	1.7	1.8	2.0	2.1	3.0	3.0	W140-01 Briar Branch @ Campbell Road
2260.0	0.2	0.4	0.7	1.1	1.5	2.0	2.0	2.0	2.4	2.4	W100 Buffalo Bayou @ San Felipe Drive
2270.0	0.4	0.8	0.8	1.0	1.5	1.7	1.8	1.9	2.8	2.8	W100 Buffalo Bayou @ West Beltway 8
2280.0	0.2	0.4	0.6	0.8	1.2	1.5	1.6	1.6	2.1	2.1	W156 Rummel Creek @ Brittmoore Road
2290.0	0.2	0.3	0.6	0.8	1.3	1.6	1.6	1.6	1.7	1.7	W100 Buffalo Bayou @ Dairy Ashford Road

Rainfall Intensity Report
5-24-16 10:00 AM through 5-28-16 10:00 AM

Region 1--Addicks, Barker, Cypress, Spring, and Willow

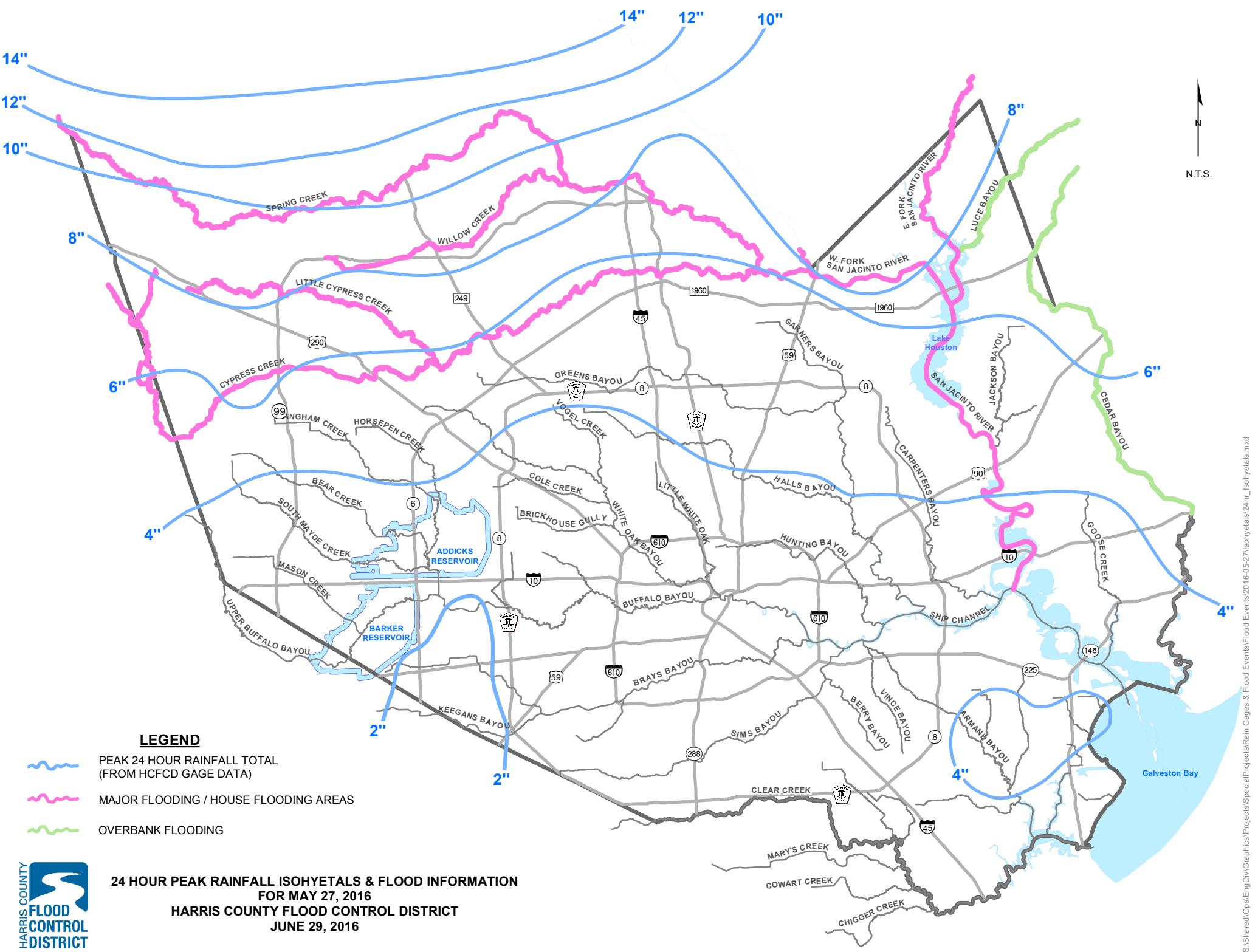
Period	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day
2-year	0.7	1.1	1.4	1.9	2.2	2.5	2.9	3.4	4.1	4.7
5-year	0.9	1.4	1.8	2.5	3	3.3	4	4.8	5.8	6.6
10-year	1	1.5	2.1	2.8	3.5	3.9	4.9	5.9	7.1	8.1
25-year	1.1	1.8	2.4	3.4	4.2	4.8	6.1	7.4	9	10.1
50-year	1.2	2	2.7	3.8	4.9	5.6	7.2	8.7	10.6	11.8
100-year	1.3	2.2	3	4.2	5.5	6.5	8.5	10.2	12.4	13.6
500-year	1.5	2.7	3.9	5.5	7.5	9	12.2	14.7	17.7	18.7

Region 2--Brays, Buffalo, Greens, Hunting, Luce, West Fork San Jacinto, and White Oak

Period	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day
2-year	0.7	1.1	1.5	2.0	2.3	2.6	3.1	3.7	4.4	5.0
5-year	0.8	1.4	1.8	2.5	3.1	3.5	4.3	5.1	6.2	7.1
10-year	0.9	1.5	2.1	2.9	3.6	4.1	5.1	6.2	7.6	8.6
25-year	1.0	1.7	2.4	3.4	4.3	5.0	6.4	7.8	9.6	10.8
50-year	1.1	1.9	2.7	3.8	5.0	5.8	7.6	9.2	11.3	12.5
100-year	1.2	2.1	3.0	4.3	5.7	6.7	8.9	10.8	13.2	14.5
500-year	1.4	2.6	3.8	5.5	7.6	9.2	12.8	15.5	18.9	20.0

Region 3--Armand, Carpenters, Ceder, Clear, Galveston Bay, Goose, Jackson, Lower San Jacinto River, Sims, Ship Channel and Vince

Period	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day
2-year	0.7	1.1	1.5	2.0	2.4	2.7	3.2	3.8	4.5	5.3
5-year	0.8	1.4	1.9	2.5	3.1	3.5	4.4	5.3	6.4	7.5
10-year	0.9	1.5	2.1	2.9	3.7	4.2	5.3	6.4	7.8	9.0
25-year	1.0	1.7	2.4	3.4	4.4	5.1	6.6	8.0	9.8	11.2
50-year	1.1	1.9	2.7	3.8	5.0	5.9	7.7	9.5	11.6	13.1
100-year	1.2	2.1	3.0	4.3	5.7	6.8	9.1	11.1	13.5	15.1
500-year	1.4	2.5	3.7	5.5	7.7	9.4	13.1	15.9	19.3	20.7



LEGEND

- PEAK 24 HOUR RAINFALL TOTAL (FROM HCFCD GAGE DATA)
- MAJOR FLOODING / HOUSE FLOODING AREAS
- OVERBANK FLOODING



24 HOUR PEAK RAINFALL ISOHYETALS & FLOOD INFORMATION
FOR MAY 27, 2016
HARRIS COUNTY FLOOD CONTROL DISTRICT
JUNE 29, 2016

SUMMARY SHEET - HCFCD HIGH WATER MARKS

7/5/2016

SAN JACINTO RIVER G103-00-00

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS												
								4/23/79	5/20/83	ALICIA 8/18/83	5/18/89	6/27/89	3/4/92	10/18/94	10/18/98	11/14/98	IKE 9/13/08	3/12/16	4/18/16	5/27/16
IH-10 EAST		28.04	-0.1	6.1*	11.3*	12.9*	18.1*	5.4						(3)	4.6	6.1	12.6		4.5	8.6
RIO VILLA SUBDIVISON	710	N/A	-0.4								14.5	9.6	8.3	(3)	(3)	(3)			9.3	12.2
US 90	720	39.01	-0.2	14.8	20.6	23.7	28.9	19.3	16.2	12.7	18.8	14.7	11.0	24.6	14.1	17.9	16.5		14.9	18.1
OLD US 90		31.53	-0.1	16.3	22.7	26.1	32.0							28.1	15.2	19.6	14.6		15.6	19.4
LAKE HOUSTON SPILLWAY	750	63.48	-0.5	45.4	48.8	49.9	52.0		48.0	47.1	49.1	47.4	47.0	52.3			44.5		46.2	47.8
W LAKE HOUSTON PARKWAY		57.86	-0.7	46.8	50.3	51.7	56.2							53.7	39.9	49.9	49.0		47.9	51.1
US 59	760	70.40	-0.6	56.5	63.0	64.8	69.1	51.0	52.1		53.9	51.7	49.8	66.7			53.0		57.5	61.9
HAMBLEN @ Loop 494		58.19	-2.5	56.5	63.0	64.8	69.1								54.4		51.6		55.7	61.5
E. FORK SAN JAC. @ FM 1485	790	78.07	-0.1	63.3	68.5	70.6	75.9							76.2	63.5	71.6 ⁴	56.9	67.0	63.7	69.7

NOTE: BRIDGE AND HIGH WATER ELEVATIONS ARE ON 1988 NAVD; 2001 ADJ

¹ = Suspect elevation, low confidence in field

(2) SAN JACINTO RIVER SPILLWAY ELEV OF 44.5' IS BASED ON '63/'64 ADJ, '78 ADJ IS 42.0', '01' ADJ IS 41.5'

(3) INACCESSIBLE

⁴ = based on ALERT gage data

* = Combined Probability (includes storm surge and rainfall)

NOTE: G103-07-05 (Banana Bend) location was severely damaged in the October 1994 Flood, Gage 710 moved from Bannana Bend to Rio Villa on 10-29-2013

Exceedance probability elevations are from the June 9th, 2006 TSARP Flood Insurance Study.
High water marks are approximate. HCFCD assumes no responsibility for their accuracy.

SUMMARY SHEET - HCFCD HIGH WATER MARKS

7/5/2016

SPRING CREEK J100-00-00

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS															
								4/20/79	11/26/85	10/18/94	10/19/98	11/14/98	ALLISON 6/5/01	IKE 9/13/08	4/28/09	7/12/12	4/18/16	5/27/16					
END OF LEE RD		71.81	-0.5							79.5				79.3 ¹	60.2	N/A	N/A	N/A	71.2				
RILEY FUZZEL RD		103.30	-0.7	90.8	96.8	99.0	105.4			104.1	92.2	93.5		94.7 ¹	83.1	82.5	88.0	93.7	97.5				
IH 45	1050	115.07	-0.7	98.7	103.6	105.8	111.6		101.0	111.6	101.1	103.3		105.1 ¹	97.7	92.9	98.1	103.6	108.5				
KUYKENDAHL	1060	143.57	-1.1	129.7	134.9	136.7	141.4								124.6	121.6	128.5	134.0	140.1				
FM 2978	1040	152.78	-0.8	144.9	148.8	150.4	154.4		154.4	155.1	143.3	143.2		160.1 ¹	144.4	137.5	145.2	149.1	153.4				
SH 249	1070	167.51	-0.9	155.0	159.7	161.3	165.0	150.6	156.3	162.2 ¹	155.9	157.7		165.1 ¹	149.6	147.2	156.4	161.6	165.5				
CYPRESS ROSE-DECKER		171.76	-0.5	168.7	172.3	173.8	177.9	163.5	148.0	180.3	170.5	170.1		175.0	168.3	162.7	169.0	173.8	175.9				
CARDINAL RD		177.31	-0.7	182.5	186.3	187.8	191.7	182.3	169.3	192.3	185.9	182.2		185.0	175.8	176.3	174.9	188.6	187.3				
ROBERTS CEM-RD		180.69	-0.2	184.7	188.1	189.6	193.2	202.8		193.3	199.4 (?)			185.6	180.9	178.9	179.2	187.0	189.9				
NICHOLS		202.96	-0.3	205.0	207.1	208.1	210.8			211.3	208.7	205.2		210.1	202.7	200.4	202.7	207.3	208.3				
HEGAR RD	1090	217.14	-0.3	215.9	217.9	218.9	221.4			224.0	219.9	215.4		217.5	213.0	213.2	217.7	222.8	222.2				
MARGERSTADT		231.06	-0.3	230.6	232.5	233.3	234.7			236.1	235.6	236.5		231.0	229.3	225.0	229.1	234.1	234.4				
KICKAPOO RD		242.69	-0.3	242.2	244.0	244.6	246.2		233.2	245.7	246.6	244.4		242.3	236.6	235.7	239.5	244.4	244.0				
FIELD STORE RD		254.96	-0.2	255.5	256.6	257.0	258.1							253.9	251.3	250.1	254.1	258.3	257.9				
FM 1488		282.56	-0.2	271.4	272.0	272.4	273.1			276.8	277.2	275.3		279.1	272.7	271.9	274.0	275.7	275.7				
J109-01 @ CYPRESSWOOD		94.53	-0.8							92.7					88.2	88.7	86.1	89.8	89.1				
INSIDE NORTHGATE CROSSING LEVEE		99.73	-0.7							109.7						94.5	N/A	N/A	N/A				

NOTE: BRIDGE AND HIGH WATER ELEVATIONS ARE ON 1988 NAVD; 2001 ADJ

¹ = Suspect elevation, low confidence in field

(?) = Survey Dept research needed to confirm elevation

Exceedance probability elevations are from the June 9th, 2006 TSARP Flood Insurance Study.
High water marks are approximate. HCFCD assumes no responsibility for their accuracy.

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS																	
								10/49	CARLA 9/61	1/19/79	9/19/79	8/31/81	5/21/83	5/19/89	6/26/89	10/18/94	10/19/98	11/14/98	6/9/01	12/14/05	IKE 9/13/08	4/28/09	7/12/12	4/18/16	5/27/16
CYPRESSWOOD DR	1110	79.65	-0.5	68.2	75.0	77.8	85.4									79.2	65.5	70.7	72.5	63.2	68.9	66.0	64.5	71.4	73.0
TRESCHWIG		85.39	-1.4	76.4	79.2	80.2	85.4							78.0		78.4	75.3	73.7	78.5	70.8	76.6	74.8	71.8	78.3	75.5
ALDINE WESTFIELD		89.06	-1.4	79.7	83.0	84.2	86.3	85.3				78.9	76.6	83.2	81.5	80.8	78.4	77.9	82.4	73.5	80.5	79.2	74.2	81.7	77.6
HARDY ROAD		94.85	-2.0	84.9	88.1	89.5	91.5	89.8	80.9		81.8		81.6			83.7*	85.4	81.7	86.9	81.6	84.4	84.7	79.5	86.9	83.4
I.H. 45	1120	101.82	-2.1	91.2	93.0	94.4	97.3	95.5	87.5	84.3	87.3	88.6	83.8	92.1	90.7	88.0	89.1	86.8	92.5	84.9	89.3	87.9	83.6	90.6	85.6
KUYKENDAHL	1130	109.01	-1.9	97.1	100.6	102.2	107.0	103.6	95.0	96.5	97.6	97.5	96.4	101.3	99.1	99.4	98.2	97.1	100.9	92.7	97.2	96.8	96.5	101.4	96.5
TC JESTER		NA																						105.4	100.7
STUEBNER-AIRLINE RD	1140	115.95	-1.7	104.9	108.5	109.6	112.3	110.7		105.6	104.0		102.4	108.0	105.3	107.9	106.8	104.9	109.7	101.8	104.3	104.6	103.7	110.3	104.2
CHAMPION FOREST DR		110.31	-1.5	108.7	112.0	113.0	115.5						105.2	108.5		110.3	109.5	107.3	109.5	102.2	106.9	107.4	108.9	112.4	105.3
CYPRESSWOOD DR		120.21	-2.2	112.2	114.8	115.8	118.1										112.7	110.8	114.8	111.5	110.6	111.2	111.7	115.5	111.7
CUTTEN		121.47	-2.1	113.8	116.3	117.4	119.9									114.6	117.6	112.2	114.6	107.7	111.4	112.7	114.6	117.4	112.5
SH 249	1150	128.69	-1.4	115.7	118.9	120.1	122.5	123.7		119.3	118.5		116.8	114.2	113.7	119.4	120.1	116.3	120.5	N/A	N/A	116.5	119.2	120.3	116.8
JONES		126.98	-1.2	118.3	121.1	122.3	125.1									121.0	122.1	119.8	121.2	109.2	116.3	119.0	121.5	122.5	119.8
CYPRESSWOOD 369B		128.42	-1.1	119.5	122.2	123.4	126.2										123.5	121.1	122.9	109.5	117.4	120.3	122.8	125.3	121.2
GRANT ROAD	1160	127.25	-2.2	122.3	124.3	125.2	127.6	123.4		122.6	122.7	120.4	120.6		115.3	125.4	124.3	122.9	123.8	112.6	119.0	123.1	124.6	127.4	124.2
N. ELDRIDGE PARKWAY	1165	134.31	-2.4	124.3	126.3	127.3	129.7									126.1	125.4	123.5	125.9	113.8		124.5	125.0	128.6	125.4
HUFFMEISTER ROAD	1170	134.24	-1.6	128.4	130.4	131.4	133.7			123.5	128.1		127.4			130.0	131.6	129.6	129.8			129.6	130.7	132.9	129.8
TELGE ROAD		139.71	-1.6	132.1	134.2	135.2	137.5		131.9	132.4			131.8			134.5	135.4	134.4	N/A			132.7	133.2	136.9	132.3
BARKER CYPRESS		144.00	-2.4	136.1	138.2	139.1	141.2										138.8	137.2	137.5			135.8	137.4	138.9	136.3
U.S. 290	1175	147.52	-1.0	137.0	139.3	140.2	142.4	137.7	131.0		136.8	135.0	136.2			143.5	138.7	137.4	138.2			137.3	138.9	141.7	n/a
HOUSE HAHN ROAD		149.00	-1.0	144.7	145.8	146.4	148.0						144.8			145.7	147.0	142.0	145.1			145.0	145.1	148.4	147.7
KATY HOCKLEY ROAD	1180	162.20	-0.4	161.5	162.5	162.9	164.0			160.5			160.8			163.0	162.9	161.3	160.6			159.9	159.8	162.3	160.5
SHARP ROAD		164.42	-0.1	167.6	169.2	169.9	171.7			166.5						168.9*	166.8	163.5	164.9			165.8	166.7	168.9	168.0
K166 @ MATHIS	1190	206.86	-0.6	208.8	209.7	210.1	211.1																207.9	209.3	208.1
K111 @ FM 1960		81.53	-1.4	71.9	75.0	77.8	85.3									74.6		71.4			73.3	69.0	67.7	76.1	68.2
K133 @ CYPRESSWOOD		108.36	-1.5	108.5	111.3	112.4	115.1									109.9	108.8	107.3			106.5	106.5	N/A	110.8	105.4
K142 @ JONES RD		121.74	-2.3	117.2	120.2	121.5	124.2												121.4		116.9	119.1	120.1	123.7	119.4

NOTE: BRIDGE AND HIGH WATER ELEVATIONS ARE ON 1988 NAVD; 2001 ADJ

(?) = Survey Dept research needed to confirm elevation

All K100 exceedance probability elevations based on PMR issued 3/22/2010

K111, K133, K142 exceedance probability elevations are from the June 9th, 2006 TSARP Flood Insurance Study.
High water marks are approximate. HCFCD assumes no responsibility for their accuracy.

SUMMARY SHEET - HCFCD HIGH WATER MARKS

7/5/2016

LITTLE CYPRESS CREEK L100-00-00

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS														
								10/18/94	10/19/98	11/14/98	ALLISON 06/09/01	IKE 09/13/08	4/28/09	7/12/12	3/10/16	4/18/16	5/27/16					
KLUGE	1210	137.03	-1.7	132.5	134.5	135.1	136.1	136.3		133.9	135.3	128.7	133.4	135.4	131.3	136.4	135.5					
SPRING CYPRESS		144.56	-1.4	140.8	142.9	143.8	145.7	145.3	144.6	141.8	144.0	139.0	139.4	143.9	141.0	145.2	143.0					
CYPRESS ROSEHILL	1220	164.10	-0.8	158.0	159.1	159.5	160.7	159.1	160.2	159.2	159.5	156.0	158.6	160.4	159.0	162.1	161.3					
MUESCHKE		166.73	-1.1	166.3	167.3	167.8	169.1	166.8	167.1	167.1	168.5	164.4	166.6	168.3	167.3	172.2	169.7					
BAUER		190.03	-0.4	186.6	187.4	187.8	188.7	188.7	188.7	187.5	187.7	186.0	186.5	188.9	187.1	189.7	189.7					
BECKER	1230	200.12	-0.6	195.2	196.0	196.2	196.9	197.1	197.0	195.8	196.4	193.5	195.4	197.2	195.1	197.8	197.3					
ROBERTS		204.10	-0.4	202.2	203.2	203.6	204.5	204.4	205.0	202.8	203.1	200.8	202.2	204.6	202.6	205.6	204.9					
BAUER-HOCKLEY		212.93	-0.4	207.2	207.7	207.9	208.5	210.1	209.5	208.9		206.4	207.3	210.9	207.5	211.8	209.3					
HEGAR @ L120		220.01	-0.9					216.9	219.1			216.6	217.8	220.0	218.08	219.5	219.8					
KERMIER @ L120		231.55	-0.5					216.7	227.0				224.4	226.2	225.6	228.1	227.0					
KICKAPOO @ L120		235.71	-0.9					238.8	242.4				234.7	237.6	234.9	238.3	237.9					

NOTE: BRIDGE AND HIGH WATER ELEVATIONS ARE ON 1988 NAVD; 2001 ADJ

Exceedance probability elevations are from the June 9th, 2006 TSARP Flood Insurance Study.
High water marks are approximate. HCFCD assumes no responsibility for their accuracy.

SUMMARY SHEET - HCFCD HIGH WATER MARKS

7/5/2016

WILLOW CREEK M100-00-00

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS														
								1/19/79	4/19/79	9/21/79	11/26/85	10/18/94	10/19/98	11/14/98	ALLISON 6/9/01	7/26/06	IKE 9/13/08	4/28/09	7/12/12	3/10/16	4/18/16	5/27/16
GOSLIN RD		113.48	-1.4	116.4	121.6	123.0	128.6		110.4	109.3	109.9	122.3	108.9	110.8	108.7	110.9	111.8	107.5	108.9	107.0	115.3	115.4
KUYKENDAHL	1320	135.53	-1.4	129.4	131.4	132.3	134.5	129.0	126.1	127.2		127.8	127.2	126.6	128.5	129.0	132.0	128.4	126.4	125.7	132.0	130.1
FM 2920		142.96	-1.4	138.9	140.8	141.6	144.0	137.3	136.2	136.0	137.8	140.7	139.4		140.6	139.0	140.2	139.8	137.9	136.2	140.9	141.0
HUFFSMITH KOHRVILLE		149.43	-0.9	149.5	151.0	151.7	154.1	149.4			147.1	150.4	149.5	147.9	150.0	149.7	148.3	147.7	148.3	147.6	151.5	150.5
SH 249	1340	161.13	-0.4	157.4	158.6	159.1	160.6	161.0	163.6		156.6	157.7	156.9	155.1	152.2	157.6	156.9	155.9	156.9	156.0	158.6	158.0
TELGE RD		161.83	-0.9	160.7	161.6	162.1	163.6			158.0		160.3	161.2	160.8	162.6	161.3	161.3	160.7	159.5		161.0	162.0
CYPRESS ROSEHILL		168.79	-0.9	168.1	168.5	168.7	169.1				164.3	167.2	168.3	166.5	167.2	167.7	167.1	168.0	167.3	167.2	167.8	167.0

NOTE: BRIDGE AND HIGH WATER ELEVATIONS ARE ON 1988 NAVD; 2001 ADJ

Exceedance probability elevations are from the June 9th, 2006 TSARP Flood Insurance Study.
High water marks are approximate. HCFCD assumes no responsibility for their accuracy.