

MEMORANDUM



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

DATE: October 5, 2020

TO: HCFCF Flood Watch/Partners

FROM: Jeff Lindner
Meteorologist / Hydrologic Operations Director

RE: Immediate Report – Final
Tropical Storm Beta -September 21, 2020 – Rainfall and Flood Information

This is the first and final report summarizing the heavy rainfall and flooding associated with the landfall of Tropical Storm Beta from September 20-23, 2020.

GENERAL FLOODING STATEMENT

Tropical Storm Beta formed over the west-central Gulf of Mexico on September 18th and moved slowly northward. An area of high pressure over the southern United States resulted in Beta turning slowly toward the west-northwest and making landfall along the upper Texas coast at Matagorda Island at 10:00 p.m. on September 21st. Outer rainbands associated with Beta began to affect the area around midday on September 20th, and increased in coverage and intensity as the center of the tropical storm approached and made landfall along the upper Texas coast. Periods of heavy rainfall occurred in the outer rainbands of Beta especially on the afternoon and evening of the 21st, from portions of central and northern Galveston and Brazoria Counties into southern and southwestern Harris County and northeast Fort Bend County. As the center of Beta moved slowly east-northeast across the coastal counties of southeast Texas on the 22nd, additional bands of heavy rainfall developed over central, northwest, and northern Harris County late in the afternoon into the evening hours.

The combination of strong high pressure over the southern United States and the low pressure associated with Tropical Storm Beta resulted in a prolonged period of strong east-northeast and northeast winds across much of the northern Gulf of Mexico. This large area of strong winds resulted in a minor to moderate coastal flood event along the upper Texas coast starting on the afternoon of the 19th and lasting until 23rd. Water levels in coastal areas of southeastern Harris County peaked with the high tide on the 21st around sunrise resulting in minor to moderate coastal flooding in the Seabrook, Shoreacres, and lower San Jacinto River as well as many locations around Clear Lake. Tide levels peaked between 3.5-5.0 feet (NAVD 1988) or 2.0-3.0 above normally dry ground near the coast.

SEPTEMBER 20-23 RAINFALL

Duration

The rainfall associated with Beta occurred over a 48-60-hr period across Harris County. The heaviest rainfall occurred in a 12-24-hr period from the afternoon of the 21st into the morning of the 22nd across the southern and southwestern portions of Harris County. A secondary band of moderate to heavy rainfall occurred over central and northern portions of Harris County on the afternoon of the 22nd into the early morning hours of the 23rd. All rainfall associated with Beta ended around sunrise on the 23rd.

While Beta did produce heavy rainfall over the county, there were frequent breaks in the training rainbands and overall rainfall intensities were generally in the 1.0-2.0 inch per hour range. The lower rainfall rates along with breaks in the heavy rainfall allowed most creeks and bayous and internal drainage systems to effectively carry storm water capacities with limited flooding.

Total Amounts

Total rainfall amounts averaged 8.0-12.0 inches over the southern and southwestern parts of Harris County from Friendswood to Pearland to the Mission Bend area over a 24-hr period. The 48-hr storm totals averaged 10.0-14.0 inches from Friendswood to Pearland to Mission Bend. A large portion of Harris County recorded storm totals for the 48-hr period between 2.0-6.0 inches. There was a strong gradient in rainfall of 10-14 inches over the southwest portions of Harris County to 2.5-4.0 inches over northeast Harris County for the 48-hr time period.

The table below indicates maximum point rainfall for Harris County gage locations.

Duration	Max Rainfall (in)	Duration	Max Rainfall (in)
5-min	.50	3-hr	4.5
15-min	1.1	6-hr	5.8
30-min	1.6	12-hr	8.6
1-hr	2.8	24-hr	13.0
2-hr	3.6	48-hr	14.7

Exceedance Probability –

Note: All rainfall exceedance probabilities are based off the newly adopted NOAA ATLAS 14 rainfall study for Texas.

Rainfall for the 48-hr time period:

- Clear Creek: between the 20% (5-yr) and 10% (10-yr)
- Brays Bayou: between the 20% (5-yr) and 10% (10-yr)
- Keegans Bayou: 20% (5-yr)
- Willow Waterhole: 10% (10-yr)
- Sims Bayou: between the 50% (2-yr) and 2% (50-yr)
- Buffalo Bayou: between the 20% (5-yr) and 10% (10-yr)

- White Oak Bayou: 20% (5-yr)
- Cypress Creek: between less than a 50% (2-yr) and 10% (10-yr)

All other Harris County watersheds were generally less than a 50% (2-yr) rainfall exceedance probability.

RAINFALL COMPARISON OF IMELDA, HARVEY, ALLISON, and BETA

Rainfall rates associated with Tropical Storm Beta were significantly lowered than recent tropical storms that have impacted Harris County. The lower rainfall rates were likely a function of a dry air mass wrapping into the circulation of the tropical storm and a general lack of organized and persistent thunderstorm activity. All tropical systems are different, and their impacts can vary significantly by location. Harris County was fortunate with Beta that the short duration rainfall rates remained slow enough throughout the event that drainage systems could maintain effective drainage. Additionally, dry grounds leading into the event, when combined with slow rainfall rates, allowed at least the first few inches of rainfall to be absorbed by the ground helping to reduce run-off. As the chart below shows, for the 1-hr rainfall rate, Beta was nearly 50% lower than Imelda, Allison, and Harvey and nearly 8-10 inches lower for the 3-hr rainfall rates.

The following chart compares the maximum rainfall amounts recorded in Harris County from Tropical Storm Imelda, Hurricane Harvey, Tropical Storm Allison, and Tropical Storm Beta for various time periods.

	Beta	Imelda	Harvey	Allison
5-min	.50	1.2	.90	1.1
15-min	1.1	2.1	2.0	2.2
30-min	1.6	3.8	3.6	4.2
1-hr	2.8	6.4	6.8	5.7
2-hr	3.6	9.2	11.9	9.9
3-hr	4.5	10.9	14.8	13.5
6-hr	5.8	14.3	18.9	21.2
12-hr	8.6	17.9	20.9	28.3
24-hr	13.0	21.1	28.6	28.4
2-day	14.7	29.1	35.2	28.5
4 day	N/A	29.7	47.4	38.5

CHANNEL FLOODING

Note: all channel exceedance probabilities are based off the current effective FEMA profiles from the June 9, 2006 TSARP Flood Insurance Study.

Clear Creek

Overbank channel flooding occurred along nearly the entire length of Clear Creek from near SH 288 to Clear Lake. The tributaries that drain into Clear Creek from Brazoria and Galveston Counties (Chigger, Cowart, and Mary's Creeks) were all near bankfull along with the lower portions of Turkey Creek and Beamer Ditch in Harris County. High water

marks along Clear Creek indicate that the water surface elevation was generally below the 10% (10-yr) elevation along the entire channel. The portion of the channel from FM 2351 to Cullen Blvd were generally at the 10% (10-yr) exceedance probability. Flooding in and around Clear Lake was a function of elevated tides as most HCFCD gages recorded maximum readings early on the 21st prior to significant rainfall in the Clear Creek watershed. Water surface elevations along Clear Creek were similar to the October 2006 flood and generally higher than the April 2009 flood. Elevations were generally several feet lower than Harvey.

Turkey Creek

Overbank flooding was observed along the lower portions of Turkey Creek downstream of FM 1959 and water flowed over the top of the Beamer Rd. crossing. This flooding inundated mostly rural lands near the creek. Water surface elevations averaged between the 10% (10-yr) and 2% (50-yr) between Beamer Rd. and Astoria St. and generally below the 10% (10-yr) upstream of Scarsdale. High water marks along Turkey Creek were similar to floods in October 2016 and April 2009 and were 3.0-4.0 feet lower than Harvey.

Beamer Ditch

No overbank flooding was observed along Beamer Ditch although water surface elevations were near bankfull, especially along the lower end of the channel. High water marks indicated that water surface elevations averaged generally near or just above the 10% (10-yr) level and were similar to the October 2006, April 2009 and Tropical Storm Erin floods. Elevations were generally 2.0-4.0 feet below Harvey.

Taylor's Bayou

Minor overbank flooding was observed along much of Taylor's Bayou in the Shoreacres area and in portions of Taylor Lake Village. Much of this flooding was limited to rural lowlands near the bayou and low lying roadways, and a function generally of high tides. A few roads near the channel in Shoreacres were closed for much of the duration of Beta due to the high tides.

Brays Bayou

Minor overbank flooding occurred along Brays Bayou near Lawndale impacting a few structures near the low lying bayou banks in this region. No overbank flooding was observed along the remainder of the bayou with water levels generally 2.0-5.0 feet within banks. High water marks indicated that water surface elevations were below the 10% (10-yr) exceedance probabilities along the entire channel and were similar to the January 2017 flooding and several feet below Harvey, Tax Day 2016, and the Memorial Day 2015 flooding.

Keegans Bayou

Overbank flooding occurred from downstream of Beltway 8 to upstream of Wilcrest Dr. in the vicinity of the US 59 and Beltway 8 bridge crossings. This generally resulted in flooding of low lands and streets upstream and downstream of US 59. High water marks indicated that water surface elevations were generally between the 10% (10-yr) and 2% (50-yr) elevations between South Braeswood and Roark and then below the 10% (10-yr) elevations along the remainder of Keegans Bayou. Water surface elevations were similar to the January 2017 and the May 2012 floods. Elevations were several feet lower than Harvey.

South Mayde Creek

Minor overbank flooding was observed along the lower end of South Mayde Creek near and downstream of Greenhouse Rd. This area typically experiences minor overbank flooding during heavy rainfall, and flooding during Beta was limited to rural low lands near the creek, Cullen Park, and portions of roadways between Barker Cypress and Greenhouse.

HOUSE FLOODING ESTIMATES

Approximately 20-25 homes in the south-central and southern portions of Harris County. House flooding was limited to a few homes along the lowest elevations of Clear Creek and the lower end of Brays Bayou upstream of Lawndale. Additionally, there was isolated house flooding from internal drainage systems near the south 610 Loop and Cullen Blvd. House flooding in Harris County tends to be strongly correlated to the intensity of the short duration rainfall rates. In the case of Tropical Storm Beta, the short duration rainfall rates were generally below intensities that tend to lead to widespread and significant house flooding from either overwhelming of the capacity of the primary drainage systems or the exceeding of capacities of bayous and creeks. The combination of rainfall intensities, frequent breaks in the periods of heavy rainfall, and dry grounds going into the event likely helped reduce the number of homes flooded for Tropical Storm Beta.

HIGH WATER MARKS

HCFCD crews collected a total of 101 high water marks along the following watersheds: Clear Creek, Turkey Creek, Beamer Ditch, Brays Bayou, Keegans Bayou, and Willow Waterhole.

Additionally, a team from HCFCD and NWS collected 18 high water marks along the coast to document both the stillwater and wave action from Tropical Storm Beta. These marks were collected from Sargent, Texas to the Lynchburg Ferry Landing in southeast Harris County. In southeast Harris County, a total of (4) storm surge marks were obtained and stillwater values ranged from 1.0-2.0 feet above normal dry ground along portions of Toddville Rd. to 3.0 feet above normal dry ground along portions of Taylor's Bayou in Shoreacres and at the Monument Inn restaurant just south of the west landing of the Lynchburg Ferry. Maximum stillwater values of 3.0-4.0 feet above normally dry ground were found on the west end of Galveston Island and near Surfside in Brazoria

County, with wave debris lines of 6.0-9.0 feet above the normal high tide levels along the Gulf facing beaches near Surfside and Quintana Beach.

HARRIS COUNTY FLOOD CONTROL DISTRICT FACILITIES CONDITIONS

The HCFCD channels and detention basins functioned as designed and helped to reduce flood levels. All channels and detention basins were in good condition prior to the start of the rainfall and flooding. No major blockages had been reported or observed. HCFCD mowing contractors completed the 2nd of 3 mowing cycles in 8 of the 9 sectors. The one remaining sector had approximately 350 acres left to be mowed in the upper White Oak and Greens Watersheds. These areas were not substantially impacted by flooding. At the onset of rainfall associated with Tropical Storm Beta, there were no outstanding service requests related to debris or channel blockages.

HCFCD staff completed assessments of channels and basins for any blockages, erosion, bank failures and other storm related problems on October 1st. HCFCD assessments found a total of 2,200 cubic yards of debris in channels and basins that will require removal at a cost of approximately \$300,000. All debris is estimated to be removed from channels and basins by October 23rd.

PROJECTS THAT HELPED REDUCE HOUSE FLOODING

Capital projects and maintenance of the channels throughout the county helped reduce the risk of flooding and ensured the systems operated as designed during Tropical Storm Beta. Major capital project efforts in the maximum rainfall areas are discussed below.

Brays Bayou

Project Brays (a partnership project with the Corps of Engineers) construction completed to date, particularly in Willow Waterhole, likely prevented the flooding of an estimated 600 homes along Brays Bayou and its tributaries.

Sims Bayou

The Sims Bayou Federal Flood Reduction Project (a partnership project with the Corps of Engineers) construction completed to date likely prevented over 330 structures from flooding along Sims Bayou.

HARRIS COUNTY FLOOD CONTROL DISTRICT ACTIONS

- The HCFCD Flood Operations team was activated from 6:00 p.m. on September 20th, to 8:00 a.m. on September 23rd
- The Clear Creek 2nd Outlet Gates were opened on September 21st at 4:00 p.m. and closed on September 25th at 9:00 a.m.
- HCFCD conducted approximately 33 media interviews
- The Harris County Flood Warning System recorded:
 - 5 gage locations with 1.0 inch of rainfall in 15 minutes
 - 15 gage locations where channel water levels reached or exceed bankfull

- 52 gage locations where channel water levels were within 3.0 ft of bankfull
- HCFCD crews collected a total of 42 discharge measurements
- The Flood Warning System webpage recorded
 - 220,000 users for the event
 - 1.3 million page views for the event
 - Peak website traffic was approximately 78,000 users around 8:00 a.m. on the 22nd
 - A total of 5,100 individuals signed up for Flood Warning System alerts during the event, the largest single event sign-up since the release of this feature 15 months ago.

Rainfall Intensity Report
10AM 9-20-20 thru 10AM 9-23-20

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	0.2	0.5	0.6	0.8	1.1	1.2	1.5	2.3	3.9	4.7	A100 Clear Lake 2nd Outlet @ SH 146
105	0.4	0.9	1.4	1.9	2.7	3.3	4.5	7.0	11.2	12.2	Mary's Creek @ Winding Road
110	0.2	0.6	0.8	1.1	1.6	2.1	3.2	5.4	8.8	9.5	A100 Clear Creek @ I-45
115	0.5	1.0	1.6	2.7	3.2	3.7	5.0	6.3	9.0	10.2	Cowart Creek @ Baker Road
120	0.4	0.9	1.4	2.0	2.7	3.0	4.2	5.9	9.6	10.7	A100 Clear Creek @ FM 528
125	0.4	0.6	0.8	1.3	1.8	2.4	4.0	5.0	7.4	8.5	Chigger Creek @ Windsong Lane
130	0.3	0.7	1.2	1.9	2.4	2.8	4.0	5.3	8.4	9.2	A100 Clear Creek @ Bay Area Boulevard
135	0.4	0.7	1.2	1.6	2.4	3.2	4.2	6.4	10.7	11.7	A100 Clear Creek @ FM 2351
140	0.3	0.6	0.8	1.2	1.8	2.5	3.7	6.1	10.0	11.0	A119 Turkey Creek @ FM 1959
145	0.4	0.8	1.4	2.0	3.1	3.9	4.8	7.3	12.3	13.4	A100 Clear Creek @ Dixie Farm Road
150	0.4	1.0	1.6	2.5	3.5	4.1	5.2	7.4	10.8	11.8	A100 Clear Creek @ Country Club Drive
160	0.2	0.7	1.0	1.8	2.4	2.4	4.0	6.4	9.6	10.9	A120 Beamer Ditch @ Hughes Road
170	0.3	0.6	0.6	0.8	1.4	1.8	2.8	4.8	7.1	7.9	A100 Clear Creek @ Nassau Bay
175	0.3	0.8	1.2	1.8	3.0	3.6	4.6	7.7	12.2	13.6	A100 Clear Creek @ Pearland Pkwy
180	0.4	0.8	1.4	2.1	3.4	4.2	5.4	8.6	12.2	13.7	A100 Clear Creek @ Mykawa Road
190	0.4	0.9	1.5	2.8	3.4	3.9	5.1	6.8	10.8	12.5	A100 Clear Creek @ SH 288
200	0.4	0.6	0.7	1.0	1.4	1.5	1.9	3.5	4.8	5.6	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	0.4	0.6	0.8	1.0	1.2	1.6	2.8	4.1	4.8	B100 Armand Bayou @ Pasadena Lake (Nasa Road 1)
220	0.2	0.3	0.5	0.8	0.9	1.0	1.2	1.6	2.9	4.0	B100 Armand Bayou @ Genoa-Red Bluff Road
230	0.2	0.3	0.4	0.7	0.9	1.0	1.4	1.8	3.0	4.0	B106 Big Island Slough @ Fairmont Parkway
245	0.2	0.3	0.6	1.0	1.2	1.4	1.8	2.1	3.5	4.5	B100 Armand Bayou @ Space Center Boulevard
250	0.3	0.5	0.6	0.8	1.2	1.4	2.0	3.6	5.3	6.4	B104 Horsepen Creek @ Bay Area Boulevard
270	0.2	0.4	0.6	1.0	1.1	1.3	1.6	2.0	3.4	4.6	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	0.3	0.8	1.0	1.2	1.7	2.0	3.1	4.4	6.6	7.8	C106 Berry Bayou @ Nevada Avenue
320	0.2	0.6	0.8	1.0	1.5	1.7	2.8	3.8	5.4	6.8	C106 Berry Bayou @ Forest Oaks Boulevard
340	0.2	0.6	0.8	1.2	2.0	2.2	3.7	5.0	7.7	9.2	C100 Sims Bayou @ Telephone Road
360	0.3	0.6	1.0	1.3	2.2	2.6	4.2	7.3	10.9	12.5	C100 Sims Bayou @ Martin Luther King Road
370	0.5	0.9	1.6	2.4	3.6	4.5	5.4	8.2	13.0	14.7	C100 Sims Bayou @ SH 288
380	0.5	1.0	1.3	2.4	3.1	3.7	4.6	7.4	10.9	12.7	C100 Sims Bayou @ Hiram-Clarke Road

Rainfall Intensity Report
10AM 9-20-20 thru 10AM 9-23-20

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	1.2	1.9	2.9	3.4	5.3	8.1	12.2	13.6	NRG Park
405	0.2	0.4	0.8	0.9	1.6	1.9	3.6	5.0	7.0	8.9	D100 Brays Bayou @ Martin Luther King Blvd
410	0.2	0.5	0.7	1.0	1.5	1.6	2.9	3.7	5.1	6.3	D100 Brays Bayou @ Lawndale Street
420	0.2	0.6	1.1	1.6	2.4	2.9	4.8	7.6	10.4	11.6	D100 Brays Bayou @ South Main Street
430	0.3	0.8	1.3	2.3	3.6	4.1	5.8	8.5	12.2	13.6	D100 Brays Bayou @ Stella Link Road
435	0.4	0.8	1.4	2.0	2.9	3.7	4.5	8.5	12.1	13.6	D112 Willow Water Hole @ Willowbend Boulevard
440	0.4	0.7	1.3	1.7	2.4	3.0	4.6	7.9	11.5	13.0	D100 Brays Bayou @ Rice Avenue
445	0.3	0.8	1.4	2.0	3.5	4.5	5.6	8.5	11.2	13.0	D112 Willow Water Hole @ Landsdowne Drive
460	0.3	0.9	1.4	2.0	3.3	4.2	5.2	7.6	10.2	11.7	D100 Brays Bayou @ Gessner Road
465	0.3	0.7	1.2	1.9	3.1	3.8	4.6	6.8	9.1	10.4	D100 Brays Bayou @ Beltway 8
470	0.2	0.6	1.0	1.4	2.4	2.9	3.8	6.1	8.6	9.4	D100 Brays Bayou @ Belle Park Drive
475	0.3	0.6	1.1	1.6	2.7	3.2	4.1	6.2	8.4	9.3	D100 Brays Bayou @ Bellaire Boulevard
480	0.4	1.1	1.5	1.9	2.7	3.2	3.9	5.4	7.4	9.0	D118 Keegans Bayou @ Roark Road
485	0.3	0.6	1.2	1.9	2.8	3.1	3.8	5.5	7.6	8.4	D100 Brays Bayou @ SH 6
490	0.4	0.9	1.6	2.0	2.9	3.5	4.3	5.9	7.6	9.2	D118 Keegans Bayou @ Keegan Road
495	0.3	0.8	1.3	1.6	2.4	2.8	3.7	5.4	7.3	8.6	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	0.3	0.7	0.9	1.1	1.6	2.2	3.8	5.5	8.5	9.8	Harris County Flood Control @ Brookhollow
520	0.2	0.6	0.9	1.0	1.5	1.9	3.6	4.8	7.7	8.6	E100 White Oak Bayou @ Heights Boulevard
530	0.4	0.7	1.1	1.2	1.5	2.0	3.6	4.8	8.0	9.2	E100 White Oak Bayou @ Ella Boulevard
535	0.3	0.8	1.2	1.4	1.5	2.0	3.2	4.4	7.6	8.6	E100 White Oak Bayou @ Pinemont Drive
540	0.4	1.0	1.5	1.9	2.0	2.5	2.8	4.3	7.2	8.3	E100 White Oak Bayou @ Alabonson Road
545	0.2	0.6	0.8	1.1	1.4	2.2	3.2	4.8	7.7	8.9	E100 White Oak Bayou @ Fairbanks North Houston Road
550	0.3	0.5	0.8	1.2	1.7	2.2	3.2	4.9	8.2	9.4	E100 White Oak Bayou @ Lakeview Drive
555	0.2	0.5	1.0	1.6	2.3	3.0	3.7	4.9	8.2	9.2	E100 White Oak Bayou @ Jones Road
560	0.2	0.6	0.7	0.8	1.1	1.4	2.6	3.6	5.7	6.7	E101 Little White Oak Bayou @ Trimble Street
570	0.2	0.6	0.9	1.0	1.1	1.8	2.3	3.4	6.3	7.3	E101 Little White Oak Bayou @ Tidwell Road
575	0.3	0.8	1.2	1.5	1.6	2.0	3.1	4.3	7.2	8.2	E100 White Oak Bayou @ Tidwell Road
580	0.3	0.6	1.0	1.2	1.4	2.0	3.5	5.1	8.1	9.4	E115 Brickhouse Gully @ Costa Rica Road
582	0.3	0.7	1.3	1.7	1.8	2.2	4.0	5.6	8.7	10.0	E115 Brickhouse Gully @ Hollister
585	0.3	0.9	1.4	1.8	2.0	2.6	3.0	4.5	7.3	8.5	E121 Vogel Creek @ Victory Drive
590	0.3	0.7	1.0	1.3	1.4	2.0	3.7	4.9	8.0	9.3	E117 Cole Creek @ Deihl Road
595	0.4	1.0	1.6	2.0	2.2	3.7	4.0	5.5	8.3	9.4	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	0.2	0.4	0.5	0.6	0.9	1.0	1.1	1.6	3.0	4.2	A104 Taylor's Bayou @ Shoreacres Boulevard
620	0.2	0.3	0.4	0.6	0.7	0.8	0.8	1.4	2.4	3.5	F216 Little Cedar Bayou @ 8th Street
640	0.1	0.4	0.5	0.6	0.8	0.8	1.0	1.5	2.6	3.6	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	0.1	0.3	0.4	0.5	0.8	1.1	1.6	1.9	2.8	3.1	G103 San Jacinto River @ Rio Villa
720	0.1	0.3	0.4	0.7	1.2	1.5	2.0	2.2	3.1	3.6	G103 San Jacinto River @ US 90
740	0.1	0.3	0.5	0.8	1.3	1.7	2.5	2.7	3.3	3.6	G103 Lake Houston @ FM 1960
750	0.2	0.4	0.6	1.0	1.6	2.0	2.8	2.9	3.7	4.2	G103 Lake Houston Dam Spillway
755	0.2	0.3	0.6	0.9	1.4	1.7	2.6	3.0	3.4	3.9	G103 San Jacinto River @ Kingwood Country Club
760	0.2	0.4	0.8	1.2	1.6	1.7	2.6	3.0	3.9	4.3	G103 San Jacinto River @ US 59
765	0.2	0.4	0.6	1.0	1.4	1.6	1.7	2.2	3.1	3.4	G103 San Jacinto @ SH 99
770	0.2	0.4	0.6	0.7	0.9	0.9	1.1	1.2	2.0	2.6	G103 San Jacinto @ SH 242
780	0.1	0.1	0.2	0.2	0.4	0.6	0.7	1.3	1.6	1.8	Caney Creek @ FM 2090
785	0.2	0.3	0.6	0.8	1.0	1.1	1.7	2.5	2.9	3.0	Peach Creek @ FM 2090
790	0.1	0.3	0.5	0.8	0.9	1.0	1.7	2.4	2.7	2.8	G103 East Fork San Jacinto @ FM 1485
795	0.1	0.3	0.6	0.9	1.0	1.1	1.9	2.7	3.1	3.2	G103 East Fork San Jacinto @ FM 2090
796	0.1	0.2	0.3	0.4	0.6	0.7	1.3	1.9	2.4	2.5	G103 East Fork San Jacinto @ SH 105

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	0.5	0.5	0.8	1.2	1.2	1.8	2.1	4.0	5.0	H100 Hunting Bayou @ I-10
830	0.2	0.5	0.5	0.7	1.0	1.1	1.7	2.1	3.9	4.7	H100 Hunting Bayou @ Loop 610 East
840	0.3	0.5	0.6	0.7	1.0	1.2	1.9	2.2	4.3	5.0	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
910	0.3	0.7	1.0	1.2	1.6	1.9	2.8	3.7	5.5	6.6	I100 Vince Bayou @ Fairmont Parkway
920	0.2	0.5	0.6	1.0	1.2	1.4	2.3	2.8	3.9	4.9	I100 Vince Bayou @ West Ellaine Down Stream
940	0.1	0.3	0.4	0.8	1.0	1.2	1.6	2.0	2.9	4.0	I101 Little Vince Bayou @ Jackson Avenue
240	0.2	0.4	0.6	1.0	1.3	1.5	2.1	2.5	3.7	5.0	I101 Little Vince Bayou @ Burke Road

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
1050	0.1	0.3	0.6	0.8	1.0	1.2	1.4	1.7	3.2	3.7	J100 Spring Creek @ I-45
1052	0.2	0.3	0.3	0.4	0.6	0.8	1.3	1.5	2.0	2.8	Mill Creek @ FM 149
1054	0.3	0.5	0.8	1.0	1.1	1.4	2.2	2.4	3.0	5.1	Mill Creek @ FM 1486
1055	0.1	0.2	0.3	0.5	0.8	1.0	1.4	1.8	2.6	3.4	Bear Branch @ Kuykendahl
1056	0.1	0.3	0.4	0.7	1.2	1.6	2.0	2.2	2.7	3.4	Mill Creek @ FM 1774
1060	0.2	0.4	0.4	0.5	0.8	1.0	1.5	1.8	2.8	3.7	J100 Spring Creek @ Kuykendahl Road
1070	0.1	0.2	0.4	0.6	0.8	1.1	2.0	2.3	3.2	4.1	J100 Spring Creek @ SH 249
1072	0.1	0.2	0.4	0.7	1.2	1.6	2.6	2.8	3.4	4.6	Walnut Creek @ Nichols Sawmill
1074	0.1	0.3	0.4	0.8	1.2	1.8	2.5	2.6	3.2	4.1	Walnut Creek @ Joseph Road
1075	0.2	0.3	0.4	0.6	1.0	1.4	2.2	2.6	3.7	4.7	Tomball Repeater
1076	0.2	0.6	0.9	1.1	1.2	1.6	2.2	2.4	2.8	5.0	Birch Creek @ Riley Road
1080	0.2	0.3	0.4	0.8	1.3	1.8	2.5	2.8	3.9	5.0	J100 Spring Creek @ Cypress Rosehill
1084	0.1	0.2	0.5	0.8	1.2	1.6	2.2	2.4	3.0	4.1	Threemile Creek @ Joseph Road
1086	0.4	0.4	0.6	0.7	1.1	1.4	1.9	2.1	2.7	4.0	Threemile Creek @ FM 362
1090	0.1	0.3	0.5	0.8	1.2	1.4	2.0	2.2	3.5	4.9	J100 Spring Creek @ Hegar Road

Rainfall Intensity Report
10AM 9-20-20 thru 10AM 9-23-20

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	0.2	0.7	1.1	1.5	1.7	1.8	2.4	2.8	3.9	4.4	K100 Cypress Creek @ Cypresswood Drive
1115	0.2	0.4	0.8	1.3	1.8	2.0	2.6	3.0	4.5	5.1	K600 Cypress Creek @ Inverness Forest
1120	0.2	0.4	0.7	1.2	1.8	2.0	2.4	2.7	4.2	4.8	K100 Cypress Creek @ I-45
1130	0.2	0.4	0.7	1.2	1.6	2.0	2.4	2.8	4.2	4.8	K100 Cypress Creek @ Kuykendahl Road
1140	0.2	0.4	0.7	1.0	1.7	2.3	2.9	3.3	5.3	6.0	K100 Cypress Creek @ Stuebner-Airline Road
1150	0.2	0.4	0.6	1.0	1.8	2.4	3.6	4.2	7.3	8.2	K100 Cypress Creek @ SH 249
1160	0.2	0.6	0.8	1.2	1.8	2.6	4.1	5.0	8.7	10.5	K100 Cypress Creek @ Grant Road
1165	0.2	0.4	0.8	1.3	1.9	2.4	3.8	4.4	7.2	8.4	K100 Cypress Creek @ Eldridge Parkway N.
1170	0.2	0.5	0.9	1.5	2.4	3.0	4.8	5.4	9.3	10.6	K100 Cypress Creek @ Huffmeister Road
1175	0.2	0.4	0.7	1.2	2.2	2.9	4.2	4.9	8.1	9.4	K100 Cypress Creek @ US 290
1180	0.2	0.5	0.7	1.2	2.2	2.5	3.1	3.4	5.6	6.8	K100 Cypress Creek @ Katy-Hockley Road
1185	0.2	0.5	0.8	1.1	2.2	3.0	3.8	4.2	7.0	8.3	K100 Cypress creek @ Sharp Road
1186	0.2	0.4	0.7	1.1	1.6	2.0	2.6	2.9	5.2	6.3	Live Oak Creek @ Penick Road
1190	0.1	0.2	0.4	0.7	1.0	1.3	1.7	2.0	3.6	4.6	K166 Little Mound Creek @ Mathis Road
1195	0.2	0.2	0.4	0.6	1.0	1.2	1.5	1.9	2.9	3.5	Mound Creek @ FM 362
1210	0.2	0.4	0.7	1.2	1.8	2.4	4.0	4.8	8.4	10.0	L100 Little Cypress Creek @ Kluge Road
1220	0.1	0.3	0.4	0.8	1.4	1.9	3.0	3.5	6.4	7.8	L100 Little Cypress Creek @ Cypress Rosehill Road
1230	0.1	0.2	0.3	0.5	0.8	1.1	1.7	1.9	3.8	5.0	L100 Little Cypress Creek @ Becker Road

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	0.1	0.2	0.4	0.6	0.8	1.1	1.3	1.6	3.0	3.8	M100 Willow Creek @ Kuykendahl Road
1340	0.1	0.2	0.4	0.6	0.9	1.2	2.1	2.4	4.2	5.0	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	0.3	0.6	0.7	0.8	0.8	0.9	1.6	1.9	3.3	3.9	N100 Carpenters Bayou @ I-10
1440	0.3	0.8	0.9	1.0	1.0	1.0	1.9	2.1	3.4	3.8	N100 Carpenters Bayou @ Wallisville Road
1460	0.4	0.8	0.9	0.9	1.3	1.6	2.4	2.6	3.4	3.7	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	0.2	0.4	0.5	0.7	0.9	1.2	1.6	2.1	2.8	3.3	O100 Goose Creek @ SH 146
1540	0.2	0.4	0.6	0.7	1.0	1.0	1.4	1.9	3.0	3.4	O100 Goose Creek @ Baker Road

Rainfall Intensity Report
10AM 9-20-20 thru 10AM 9-23-20

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	0.2	0.7	1.1	1.3	1.4	1.7	3.0	3.2	4.5	4.9	P100 Greens Bayou @ Mount Houston Parkway
1610	0.2	0.5	0.9	1.0	1.1	1.4	2.2	2.4	4.6	5.5	P100 Greens Bayou @ Normandy Street
1620	0.2	0.7	1.0	1.3	1.8	1.9	3.3	3.4	5.2	5.7	P100 Greens Bayou @ Ley Road
1630	0.3	0.9	1.6	2.2	2.3	2.4	4.0	4.2	5.5	5.9	P130 Garners Bayou @ Beltway 8
1640	0.3	0.7	1.1	1.7	2.0	2.2	3.7	3.9	5.5	6.1	P100 Greens Bayou @ US 59
1645	0.3	0.6	1.0	1.8	2.2	2.5	3.9	4.3	5.6	6.2	P100 Greens Bayou @ Beltway 8
1650	0.3	0.8	1.4	2.1	2.2	2.4	3.5	3.8	5.2	5.6	P130 Garners Bayou @ Rankin Road
1655	0.2	0.5	1.0	1.6	2.2	2.7	3.4	3.8	5.2	5.8	P145 North Fork Greens Bayou @ Ella
1660	0.3	0.6	1.1	1.8	2.3	2.8	3.7	4.1	5.4	6.0	P100 Greens Bayou @ Knobcrest Drive
1665	0.2	0.4	0.6	1.0	1.8	2.1	2.8	3.4	5.7	6.6	P100 Greens Bayou @ Bammel N Houston Road
1670	0.2	0.4	0.6	1.0	1.8	2.2	2.8	3.6	6.3	7.2	P100 Greens Bayou @ Cutten Road
1685	0.2	0.6	1.0	1.3	1.4	1.4	2.7	2.9	4.5	4.9	P100 Greens Bayou @ Tidwell Road
1695	0.3	0.6	1.0	1.8	1.9	2.4	4.1	4.6	6.0	6.6	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	0.3	0.6	1.0	1.3	2.3	2.5	3.9	4.0	6.0	6.6	P118 Halls Bayou @ Tidwell Road
1680	0.2	0.5	0.9	1.2	1.5	1.6	2.9	3.2	5.1	5.6	P118 Halls Bayou @ Jensen Drive
1690	0.2	0.5	0.8	1.5	1.8	1.9	3.1	3.6	5.2	6.0	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	0.2	0.5	0.6	0.7	0.7	0.8	1.0	1.4	2.5	3.1	Q100 Cedar Bayou @ SH 146
1725	0.2	0.4	0.6	0.7	0.7	0.7	1.2	1.4	2.3	2.9	Smith Gully @ SH 146
1730	0.2	0.5	0.6	0.7	1.0	1.1	1.5	1.8	2.9	3.7	Q100 Cedar Bayou @ FM 1942
1740	0.2	0.4	0.7	1.2	1.5	2.0	3.2	3.4	3.8	4.0	Q100 Cedar Bayou @ US 90
1745	0.1	0.3	0.6	0.9	1.1	1.6	2.5	2.8	3.2	3.5	Q100 Cedar Bayou @ FM 1960

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	0.2	0.3	0.5	0.8	1.4	1.8	2.2	2.4	3.2	3.7	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
1930	0.2	0.4	0.6	0.9	1.2	1.6	2.5	2.8	3.2	3.6	Huffman Repeater
1940	0.2	0.4	0.7	0.9	1.2	1.5	2.5	2.8	3.3	3.6	S100 Luce Bayou @ FM 2100
1960	0.2	0.3	0.6	1.0	1.0	1.4	2.4	3.8	4.2	4.3	S100 Luce Bayou @ SH 321
1975	0.1	0.2	0.3	0.5	0.7	0.8	1.2	2.0	2.5	2.6	Tarkington Bayou @ SH 105

Rainfall Intensity Report
10AM 9-20-20 thru 10AM 9-23-20

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	0.2	0.5	0.8	1.0	1.6	2.2	3.2	4.7	6.2	6.9	Barker Dam
2015	0.2	0.5	0.8	1.0	1.5	1.9	2.5	4.4	6.0	7.0	Clodine Ditch @ Grand Mission
2020	0.2	0.5	0.9	1.3	1.8	2.1	2.7	4.8	6.6	7.3	T101 Mason Creek @ Prince Creek Drive
2025	0.1	0.3	0.6	0.8	1.2	1.5	2.2	3.8	6.3	7.3	T100 Buffalo Bayou @ Peek Road
2030	0.2	0.4	0.6	0.9	1.3	1.6	2.4	3.8	6.4	7.4	T100 Buffalo Bayou @ Greenbusch Road
2040	0.2	0.4	0.5	0.7	1.2	1.4	1.9	3.5	5.2	6.1	T100 Buffalo Bayou @ US 90
2050	0.3	0.6	1.0	1.2	1.3	1.7	2.7	3.9	6.3	7.4	Cane Island Branch @ Clay Road
2060	0.2	0.4	0.5	0.8	1.2	1.4	2.4	3.5	5.9	6.9	Willow Fork Creek @ Pederson Road
2090	0.2	0.6	0.9	1.4	1.7	2.1	3.6	3.9	7.0	8.4	Brookshire Katy Drainage District @ Morrison Road

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	0.2	0.4	0.6	0.9	1.4	2.0	2.9	3.5	5.0	5.9	Addicks Dam
2115	0.3	0.8	1.2	1.2	1.7	2.0	3.3	4.4	7.2	8.4	U100 Langham Creek @ Clay Rd
2120	0.1	0.4	0.6	1.0	1.5	1.7	3.0	3.8	6.4	7.4	U100 Langham Creek @ West Little York Road
2130	0.2	0.6	1.1	2.0	2.7	2.8	3.3	4.7	7.5	8.3	U106 Horsepen @ Trailside Drive
2140	0.2	0.5	0.8	1.5	2.4	2.7	3.4	4.1	6.8	7.9	U100 Langham Creek @ Longenbaugh Road
2150	0.2	0.3	0.5	0.8	1.2	1.7	2.8	4.0	5.6	6.5	U101 South Mayde @ Greenhouse Road
2160	0.2	0.6	0.8	1.1	1.4	2.0	3.0	3.6	6.1	7.3	U102 Bear Creek @ Clay Road
2170	0.2	0.5	0.6	0.8	1.6	2.0	3.2	4.3	5.8	6.8	U101 South Mayde @ Morton Road
2180	0.2	0.4	0.7	1.2	1.8	2.4	3.2	3.6	6.4	7.6	U102 Bear Creek @ FM 529
2185	0.2	0.5	0.8	1.3	2.4	2.9	3.8	4.2	6.3	7.4	John Paul Landing
2190	0.2	0.4	0.7	0.8	1.3	1.8	2.8	3.4	6.2	7.3	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	0.2	0.5	0.8	1.2	2.1	2.8	4.9	6.7	9.5	11.0	Houston Transtar
2210	0.2	0.5	0.7	0.9	1.3	1.5	2.5	3.2	4.9	5.8	W100 Buffalo Bayou @ Turning Basin
2220	0.2	0.6	1.0	1.1	1.4	1.7	3.3	4.4	6.7	8.0	W100 Buffalo Bayou @ Milam Street
2240	0.2	0.4	0.7	0.9	1.5	2.2	3.8	5.3	7.7	9.0	W100 Buffalo Bayou @ Shepherd Drive
2250	0.2	0.4	0.7	1.0	1.8	2.6	4.6	6.6	8.2	9.6	W140 Spring Branch @ Bingle Road
2253	0.2	0.4	0.6	1.0	1.8	2.5	4.3	5.7	7.4	8.6	W140-06 Buttermilk Creek @ Moorberry Lane
2255	0.2	0.4	0.7	1.1	2.0	2.8	4.8	6.6	8.1	9.6	W140-01 Briar Branch @ Campbell Road
2260	0.3	0.4	0.7	1.2	2.2	2.6	4.6	6.2	8.4	10.0	W100 Buffalo Bayou @ San Felipe Drive
2265	0.2	0.5	0.9	1.6	2.8	3.4	5.2	6.9	9.3	10.6	W100 Buffalo Bayou @ Piney Point Rd
2270	0.2	0.6	1.0	1.6	2.5	3.3	4.5	6.4	8.7	9.9	W100 Buffalo Bayou @ West Beltway 8
2280	0.2	0.5	0.8	1.3	2.1	2.7	3.8	5.4	7.4	8.8	W156 Rummel Creek @ Brittmoore Road
2290	0.2	0.5	0.8	1.2	1.8	2.5	3.5	5.5	7.5	8.6	W100 Buffalo Bayou @ Dairy Ashford Road

Rainfall Intensity Report

10AM 9-20-20 thru 10AM 9-23-20

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

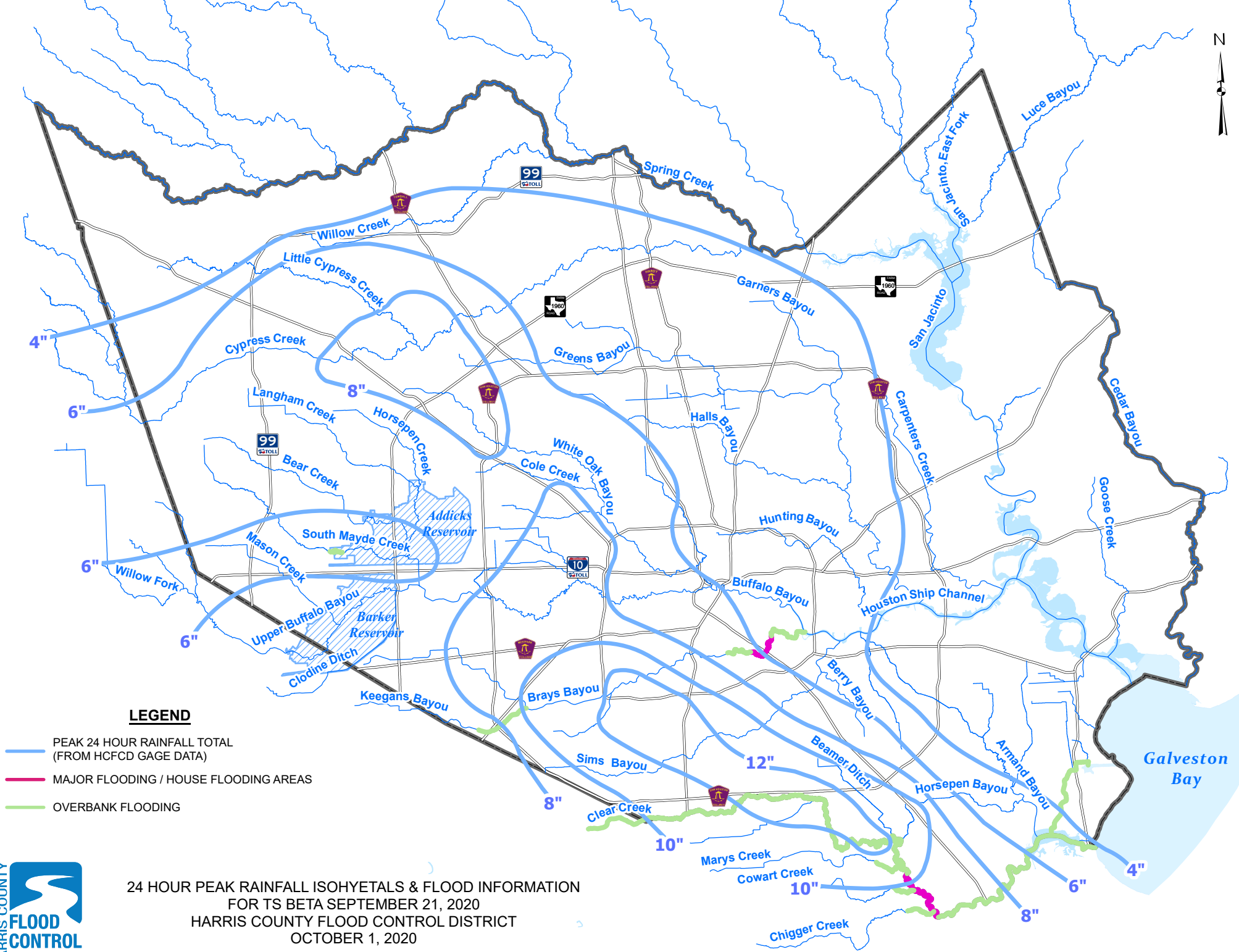
Period	5-min	15-min	30-min	1-hour	2-hour	3-hour	6-hour	12-hour	1-day	2-day
2-year	0.6	1.1	1.6	2.2	2.7	3.0	3.6	4.2	4.8	5.6
5-year	0.7	1.4	2.0	2.7	3.4	3.9	4.7	5.6	6.5	7.6
10-year	0.8	1.6	2.3	3.1	4.0	4.7	5.8	7.0	8.2	9.7
25-year	1.0	1.9	2.7	3.6	4.9	5.9	7.5	9.1	10.9	13.0
50-year	1.1	2.1	3.0	4.1	5.7	6.8	8.9	11.1	13.4	16.1
100-year	1.2	2.4	3.3	4.5	6.5	8.0	10.7	13.4	16.3	19.5
500-year	1.5	3.0	4.2	5.9	9.0	11.5	15.9	20.1	24.2	27.7

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	0.6	1.2	1.7	2.2	2.8	3.1	3.8	4.4	5.1	5.9
5-year	0.7	1.5	2.1	2.8	3.6	4.1	5.0	5.9	6.9	8.1
10-year	0.9	1.7	2.4	3.2	4.3	4.9	6.2	7.4	8.7	10.2
25-year	1.0	2.0	2.8	3.8	5.2	6.2	7.9	9.7	11.5	13.7
50-year	1.1	2.3	3.2	4.3	6.0	7.3	9.5	11.7	14.0	16.8
100-year	1.3	2.5	3.5	4.8	6.9	8.5	11.3	14.0	16.9	20.4
500-year	1.6	3.1	4.4	6.2	9.6	12.2	16.7	20.9	25.0	29.2

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	0.6	1.2	1.7	2.3	2.9	3.2	3.9	4.6	5.3	6.1
5-year	0.8	1.5	2.1	2.9	3.7	4.3	5.2	6.2	7.3	8.5
10-year	0.9	1.8	2.5	3.4	4.5	5.2	6.6	7.9	9.3	10.9
25-year	1.1	2.1	3.0	4.1	5.6	6.7	8.6	10.4	12.3	14.5
50-year	1.2	2.4	3.4	4.7	6.6	8.0	10.4	12.6	15.0	17.7
100-year	1.4	2.7	3.8	5.3	7.6	9.4	12.5	15.2	18.0	21.3
500-year	1.8	3.5	5.0	7.0	10.6	13.4	18.2	22.8	27.2	31.5

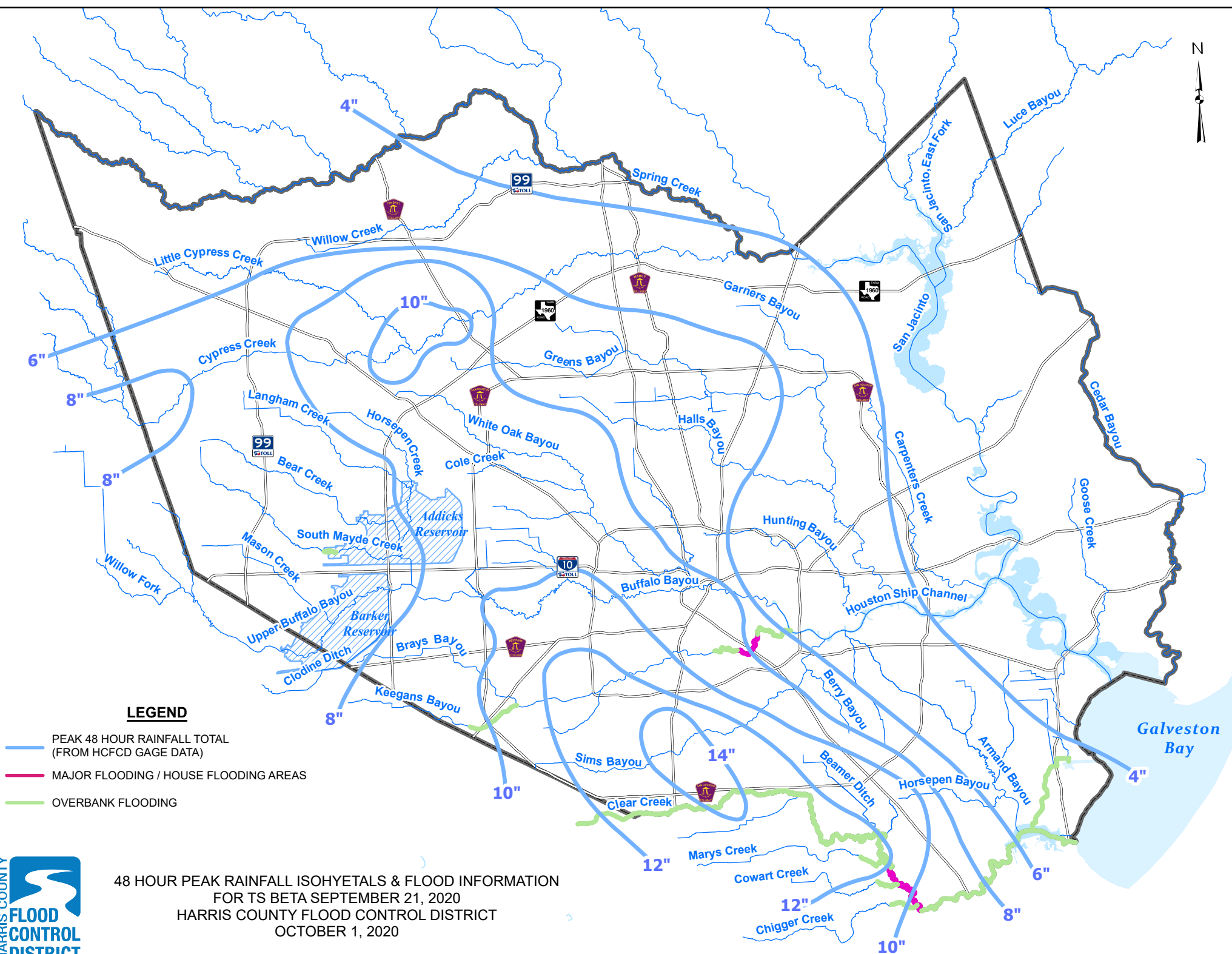


LEGEND

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

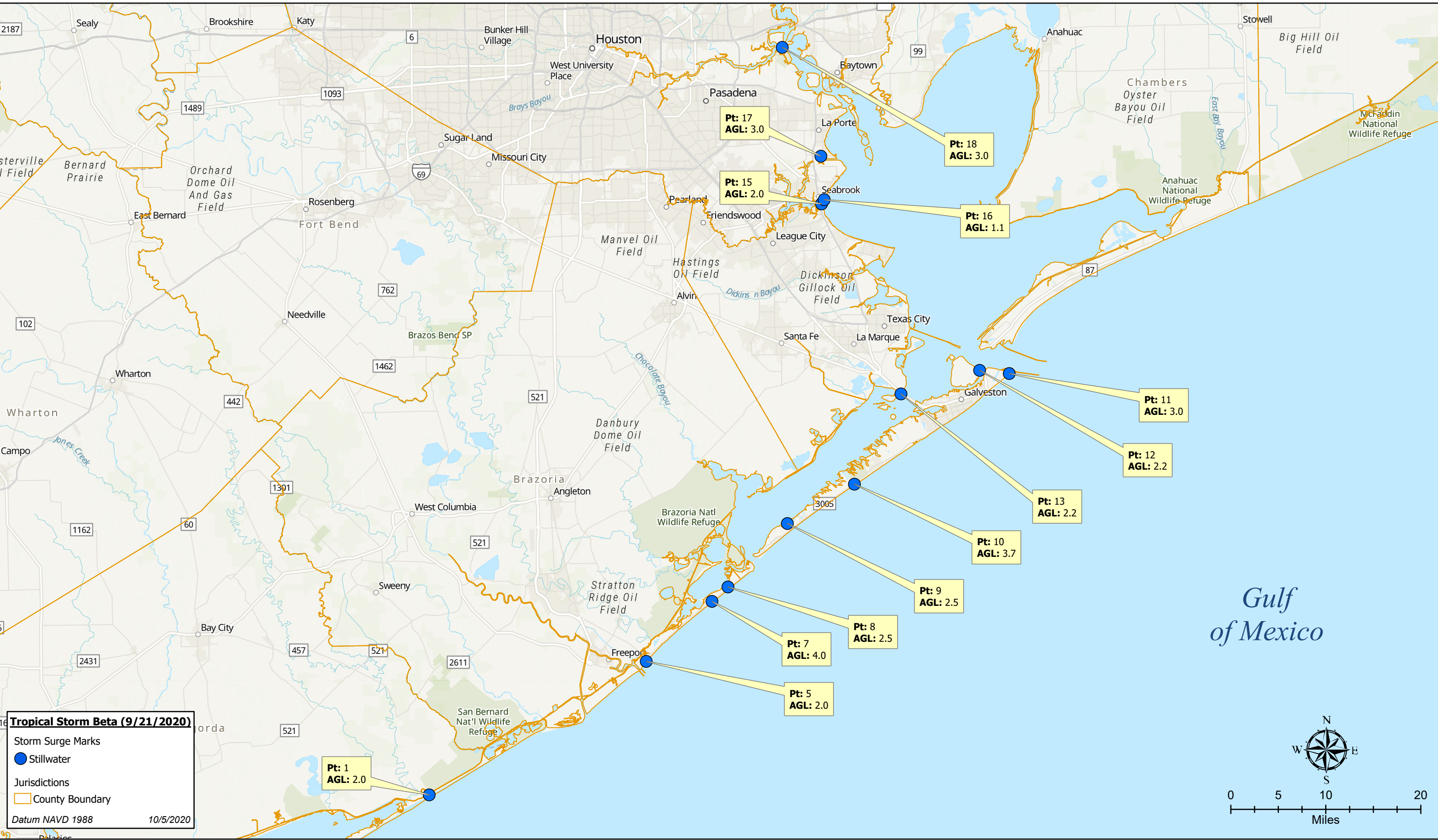
24 HOUR PEAK RAINFALL ISOHYETALS & FLOOD INFORMATION
FOR TS BETA SEPTEMBER 21, 2020
HARRIS COUNTY FLOOD CONTROL DISTRICT
OCTOBER 1, 2020





Tropical Storm Beta Surge Marks

Above Ground Level (AGL)



SUMMARY SHEET - HCFCD HIGH WATER MARKS

10/1/2020

CLEAR CREEK A100-00-00

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS															
								CLAUDETTE 6/20/73	DAVID 7/25/79	9/20/79	5/3/81	ALICIA 8/18/83	CHANTAL 8/1/89	10/18/94	ALLISON 6/5/01	6/9/01	10/16/06	ERIN 8/16/07	IKE 9/13/08	4/18/09	HARVEY 8/27/17	BETA 9/21/20	
2ND OUTLET	100	7.69	-0.6	5.8*	9.9*	11.6*	15.0*											3.0	11.4	3.8	6.0	5.1	
NASA RD 1 (Taylor Lake)	200	11.21	-0.6	6.0*	9.9*	11.6*	15.0*										3.5	3.4	10.0	4.5	8.3	5.2	
LAKE NASSAU	170	7.51	-0.8	6.8*	10.1*	11.7*	15.0*												11.1	4.8	10.0	5.9	
ST HWY 3		14.16	-0.4	7.8*	10.6*	12.0*	15.0*		12.7	8.5		8.4		7.4	1.7(?)	4.3(?)	6.0	3.7	14.8	N/A	12.8	6.1	
IH 45	110	15.79	-0.4	9.5*	11.6*	12.4*	15.2*	10.2	16.9	9.9	5.0	8.2		6.9	7.4	10.7	7.4	3.6	11.0	9.5	16.6	8.8	
BAY AREA BLVD	130	22.81	-0.5	13.8*	16.3*	17.2*	20.1*										10.5		15.2	11.5	21.1	11.7	
FM 528	120	23.89	-0.6	17.5*	20.1*	21.0*	23.1*	16.9		18.5	13.8	14.3	18.7	16.0	15.2	18.2	15.4	7.2		14.8	24.2	16.5	
FM 2351	135	26.66	-0.5	22.4	25.0	25.9	27.8	23.8	21.3	24.3	21.5	20.7	23.3	23.2	22.1	24.9	20.0	16.4	18.6	20.6	27.7	22.4	
DIXIE FARM RD (FM 1959)		36.46	-0.5							30.2		30.0	31.4	32.2	26.8	27.9	30.5		29.3	29.6	33.2	31.5	
COUNTRY CLUB DR	150	37.22	-0.8	36.4	38.3	39.1	40.8										35.7	32.4	33.9	34.1	40.3	36.4	
PEARLAND PARKWAY	175	53.11		40.6	42.0	42.6	43.7															40.5	
TELEPHONE RD		48.46	-1.3	43.5	43.9	44.3	45.0	42.5	43.6	42.0		43.2	42.9	44.6	43.2	43.2	42.5	39.7	41.3	42.0	45.9	43.6	
MYKAWA	180	48.50	-1.3	44.1	45.0	45.7	46.9	44.8	45.7	44.1				46.3	44.0	44.7	43.3	38.8	41.8	42.2	47.9	44.4	
CULLEN (FM 865)		55.15	-1.5	50.4	50.5	50.7	51.3	50.6	50.7	49.9				50.8	49.1	50.8	49.8	44.1	47.8	49.2	52.5	50.3	
S.H. 288	190	57.36	-1.6	54.2	54.9	55.3	55.7							54.8	53.0	54.0	55.8	48.0	53.2	53.7	56.3	53.7	
Brazoria Co. Tributaries																							
Chigger @ Windsong	125	26.11	-0.5	29.6	30.6	31.0	32.0												25.9	30.3	31.8	27.2	
Coward @ Baker Rd	115	28.53	0.1	27.0	28.9	29.6	31.0												28.5	29.0	30.8	25.8	
Mary's @ Melodywood	105	27.48	-0.5														26.0		25.9	27.2	30.5	25.8	

NOTE: ELEVATIONS ARE ON 1988 NAVD; 2001 ADJ

¹ = Suspect elevation, low confidence in field

(?) = Survey Dept research needed to confirm elevation

* = Combined Probability (includes storm surge and rainfall)

*Pearland Parkway was added on 9-4-18

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

10/1/2020

TURKEY CREEK A119-00-00

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS															
								CLAUDETTE 7/25/79	DAVID 9/20/79		1/22/80	5/3/81	ALICIA 8/18/83		10/18/94	ALLISON 06/09/01	10/16/06	ERIN 8/16/07	IKE 9/13/08	4/18/09	HARVEY 8/27/17	BETA 9/21/20	
BEAMER RD		25.24	-0.4	25.4	27.6	28.5	30.0	27.4	28.1	24.4	24.8	24.9	25.0		25.4	23.8	24.5	24.0	30.3	26.1			
DIXIE FARM RD (FM 1959)	140	29.92	-0.8	27.3	28.6	29.1	29.6	28.9	28.8	25.5	26.2		28.3	29.5	28.4	27.2	24.0	28.1	31.0	28.0			
RYE WATER		29.80	-0.7	27.3	28.5	29.0	29.4	29.7	29.3			27.9	28.6		28.2	27.1	24.2	28.4	31.3	28.1			
ASTORIA		29.66	-0.4	27.6	29.0	29.7	30.5	31.2	31.1				25.8	29.0	28.6	26.9	24.3	28.3	32.2	28.1			
NYACK		30.96	-0.4	28.0	29.2	29.9	30.7	31.4	28.3			23.4			28.7	26.9	24.3	28.5	32.5	28.3			
SCARSDALE		32.78	-0.4	28.5	30.0	30.1	30.9	32.6	31.8	26.6	29.7	28.1	29.2	29.4	28.8	27.2	24.1	28.9	32.5	28.2			
GRAPE WOOD		29.12	-0.6	28.9	30.5	30.8	31.8						29.2		28.4	26.9	28.6	28.7	32.2	28.1			
HUGHES		30.83	-0.8	Outside of Study Limit							23.4	29.0	28.2	31.8	28.9		28.6	29.7	32.3	29.0			

NOTE: 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

10/1/2020

BEAMER DITCH A120-00-00

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS																
								CLAUDETTE 7/25/79	DAVID 9/20/79	1/22/80	5/3/81	ALICIA 8/18/83	10/18/94	ALLISON 6/5/01	6/9/01	10/16/06	ERIN 8/16/07	IKE 9/13/08	4/18/09	HARVEY 8/27/17	BETA 9/21/20			
DIXIE FARM RD (FM 1959)		31.79	-0.6	27.5	29.1	30.3	31.0	28.0	27.7	25.7	26.9	26.1	28.8	27.4	29.4	28.5		25.7	27.4	29.1	28.2			
SCARSDALE		34.20	-0.8	28.3	30.3	31.0	32.1					27.2	30.5	31.4	31.6	31.1	27.1	28.6	30.6	31.1	29.6			
SAGEDOWNE		32.04	-0.8	29.5	31.4	32.1	33.1	32.4						31.3	32.3	30.6	27.7	29.5	30.7	31.9	30.3			
HUGHES	160	32.24	-0.7	29.8	31.9	32.6	33.5		32.3	27.8	31.2		31.3	31.7	33.1	30.7	27.5	30.2	31.6	33.2	30.4			
HALL RD		32.26	-0.6	31.1	33.1	33.7	34.7		34.1		33.9	25.4	30.7	32.5	33.6	29.8	31.1		29.9	33.3	31.2			
KIRKFAIR		32.79	-0.6	31.9	33.2	33.8	34.8	34.2					31.8	33.8	34.4	31.6	32.0	31.0	32.4	35.0	31.2			
RADIO RD		43.54	-0.7	Outside of Study Limit				39.7	41.6			37.1	35.2	38.3	40.8	36.9	38.2	36.7	39.0	42.1	38.1			
MOERS RD		44.65	-0.8	Outside of Study Limit				40.7	39.6			32.2	37.7	39.1	41.2		39.0	39.3	39.9	43.2	38.8			

NOTE: 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.

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS														
								6/18/73	8/31/81	9/19/83	10/18/94	FRANCES 9/11/98	ALLISON 6/9/01	11/17/03	IKE 9/13/08	4/28/09	1/9/12	5/26/15	4/18/16	1/18/17	HARVEY 8/27/17	BETA 9/21/20
75 TH		20.35	-0.5	14.4	17.1	18.3	21.5			12.7	11.9	13.6	16.5	8.8	16.8	N/A	10.1	12.4	11.9	8.1	16.1	11.7
LAWNDALE	410	21.97	-0.6	18.1	20.7	21.9	24.7			17.0	17.6	17.9	22.8	14.9	17.0	9.2	15.6	18.4	18.0	13.4	20.7	12.7
IH 45 (IN BOUND)		31.49	-0.6	21.7	24.4	25.6	28.3	20.1		20.8	21.7	20.7	27.6	20.0	21.6	N/A	18.4	21.6	18.5	16.9	25.5	19.1
TELEPHONE RD		25.65	-0.6	23.4	26.0	27.3	30.2	21.7	20.2		22.1	21.8	27.8	15.7	22.9	14.8	19.9	22.2	21.0	18.2	25.0	20.0
WAYSIDE		32.17	-0.6	24.9	27.8	29.2	32.0	23.5			23.0	16.8	20.4 ¹			14.2	21.0	23.3	22.5	18.2	26.9	21.6
OLD SPANISH TRAIL (OST)		31.31	-0.7	25.4	28.3	29.9	32.8				26.3		27.8	16.6	25.0	15.7	20.9	23.8	22.5	16.3	27.3	22.0
MARTIN LUTHER KING	405	36.47	-0.8	29.7	32.4	33.7	36.1			26.8	26.0	29.5	32.8	26.6	29.9	20.9	26.2	29.3	26.4	18.2	32.3	26.9
CALHOUN		33.41	-0.8	30.3	32.8	34.0	36.5	29.2	29.0		29.5	30.1	32.8	27.8	30.7	22.0	28.2	28.9	28.8	26.2	33.7	27.9
SCOTT		37.92	-1.0	31.6	34.4	35.7	37.9				31.3	32.3	32.4	29.7	31.5	24.0	29.4	32.1	30.5	28.4	35.2	30.0
ARDMORE		37.36	-1.1	32.8	35.4	36.6	38.9				33.9		38.0	31.9	32.8	25.8	31.2	34.3	29.1 ¹	30.6	37.4	31.9
SH 288		51.01	-1.2	33.6	36.4	37.8	40.1				34.8	35.2	39.3	33.9	33.6	26.7	33.0	35.2	34.2	31.7	39.2	32.0
ALMEDA RD		41.10	-1.2	34.4	37.6	39.1	41.9	35.1	34.5		36.2	34.7	37.5	33.9	35.0	27.1	33.7	37.0	36.0	32.3	40.4	32.6
D109 @ MACGREGOR	400	39.11	-1.2	34.9	38.2	39.9	43.0								34.0	N/A	36.1	38.0	37.4	35.3	41.5	36.2
HOLCOMBE BLVD		43.31	-1.2	36.3	39.4	41.1	43.9	37.4	37.3	38.4	38.2	36.7	40.3	36.7	37.2	30.7	36.5	38.2	37.7	34.9	41.7	36.3
S. BRAESWOOD BLVD.		43.68	-1.2	37.1	40.0	41.9	44.8				39.4		42.9	38.0	38.7	32.0	37.3	39.9	38.2	36.4	42.0	36.6
FANNIN		45.81	-1.3	38.4	41.2	43.3	46.6		38.9		41.0	38.5	44.0	37.8	39.4	34.0	37.9	40.1	39.5	37.5	43.5	38.1
GREENBRIAR		45.11	-1.3	39.2	41.7	43.8	47.4				40.7		42.2	39.9	39.4	35.0	38.7	41.3	40.4		44.4	38.8
N. BRAESWOOD BLVD.		47.58	-1.4	40.2	42.4	44.9	48.6				41.7		44.5	46.5	40.8	N/A	40.6	42.2	41.0		45.7	39.9
SOUTH MAIN	420	46.53	-1.4	41.0	43.1	45.7	50.0	41.2	41.5	42.4	42.2	39.6	42.9	40.6	41.3	36.5	40.5	42.9	42.1		45.7	39.8
S. BRAESWOOD		49.86	-1.3	41.4	43.7	46.6	50.1				42.7		44.3	42.0	41.9	36.3	39.9	43.1	42.4	40.5	45.9	40.0
KIRBY		44.30	-1.3	42.1	44.3	47.1	50.7	41.6	42.5		42.7	40.6	47.2	42.1	41.8	37.4	41.6	43.9	43.0		46.3	40.4
BUFFALO SPEEDWAY		49.48	-1.3	43.7	46.1	48.4	51.1	42.8			44.4	43.1	47.4	43.7	43.3	39.3	43.7	45.5	44.1	42.7	47.9	42.3
STELLA LINK	430	49.55	-1.7	45.5	47.5	49.6	51.8	45.1	46.1		46.0	44.3	48.4	46.4	45.9	43.0	45.7	48.3	47.1	45.7	49.7	44.3
SPRR		53.36	-1.7	47.2	49.5	51.3	52.6				47.8	46.3	49.4	47.1	46.5	44.0	47.2	49.1	47.7	46.8	50.7	45.6

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

NOTE: D109 @ MacGregor added as a HWM location in summer of 2005

¹ = Suspect elevation, low confidence in field

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS														
								6/18/73	8/31/81	9/19/83	10/18/94	FRANCES 9/11/98	ALLISON 06/09/01	11/17/03	IKE 9/13/08	4/28/09	1/9/12	5/26/15	4/18/16	1/18/17	Harvey 8/27/17	BETA 9/21/20
SOUTH POST OAK		50.45	-2.1	49.9	52.1	53.6	55.0			47.4	50.2	46.7	50.8	50.8	47.3	46.3	48.9	51.4	49.6	48.9	53.7	47.8
RICE BLVD	440	53.81	-2.0	50.8	52.9	54.3	55.7	49.1		52.5	51.5	47.5	50.4	51.0	47.9	47.6	50.3	52.9	51.7	49.8	54.1	48.1
CHIMNEY ROCK		54.05	-2.1	52.4	54.6	55.5	56.8	50.9	50.8	53.7	52.5	50.6	52.5	53.3	48.4	49.0	51.2	53.6	52.8	50.9	54.9	48.9
HILLCROFT		59.78	-2.2	55.1	57.2	57.4	58.7	52.3	53.3	56.4	54.5	52.6	53.7	55.1	51.5	51.6	53.8	55.9	47.7 ¹	53.3	57.2	51.5
N. BRAESWOOD		58.37	-2.2	56.2	58.7	59.1	60.5				55.7			56.5	52.8	52.9	55.0	57.1	56.8	54.3	57.9	52.2
FONDREN		59.28	-2.4	58.5	61.1	61.5	62.7	53.7	55.5	58.4	57.3	52.9	55.4		53.4	54.6	56.5	59.0	55.3	56.0	60.7	53.0
BRAES BAYOU		64.22	-2.3	59.5	61.7	62.0	63.1				58.2		55.7	59.5	55.3	55.2	55.9	60.6	57.4	56.6	61.8	54.9
GESSNER	460	62.35	-2.7	60.4	62.6	63.0	64.4	55.2		61.4	59.4	56.7	56.0	60.7	56.6	56.9	58.2	61.7	59.0	57.5	63.3	55.8
BISSONETT		66.11	-2.7	61.5	64.1	64.6	65.7	55.9				54.0			53.2	57.1	58.4	63.3	59.5	57.4	63.0	56.5
BRAEBURN GLEN		63.94	-2.7	61.7	64.6	65.1	66.4							61.8	57.4	57.0	58.7	62.9	59.9	57.5	62.9	56.9
US 59 (N BOUND)		69.93	-2.7	62.2	64.9	65.5	66.8			63.1	60.4	55.4			62.2 ¹	58.8	59.1	63.0	61.9	56.0 ¹	64.3	57.2
BEECHNUT		67.68	-2.8	65.1	67.5	68.0	69.4			65.0	61.8	60.6			55.2	60.9	59.5	63.0	62.9	58.5	66.1	57.5
WEST BELT	465	71.33	-3.0	66.2	69.0	69.6	71.1				63.5	59.0		65.0	58.7	60.9	59.6	65.9	65.8	59.1	67.5	57.9
BELLAIRE BLVD	475	70.31	-3.0	68.8	71.6	72.2	73.5			67.0	64.3	61.3		65.9	58.3	63.4	60.4	66.6	66.0	60.7	69.1	59.4
BOONE		70.90	-2.8	69.7	72.3	72.9	74.1				65.5	63.6			60.9	65.0	61.4	66.8	65.5	60.1	67.0	59.9
BELLE PARK	470	73.58	-2.7	70.6	73.1	73.6	74.7							69.6	63.8	63.9 ¹	62.7	67.0	65.3	61.2	70.6	61.4
HIGH STAR		73.84	-2.7	71.2	73.7	74.3	75.4				71.4			69.2	61.9	67.5	63.4	67.4	66.2	61.1	70.9	61.6
ALIEF CLODINE RD		78.91	-2.5	71.9	74.3	75.0	76.1			70.5	68.6			72.2	61.1	67.9	64.6	67.8	65.2	61.0	70.8	61.9
OLD WESTHEIMER		77.44	-2.5	73.6	75.7	76.4	77.7				69.7			75.3	65.8	69.6	N/A	69.2	68.0	61.9	73.3	62.5
DAIRY ASHFORD		79.42	-2.7	75.1	77.2	78.0	79.3				74.0				67.7	70.2	67.5	70.2	69.4	68.0	72.3	68.3
SYNOTT RD		80.56	-2.4	76.9	78.6	79.2	80.6			77.1	75.4	74.7			69.1	71.9	68.5	71.4	70.5	66.8	78.1	68.8
ELDRIDGE		80.77	-2.2	77.8	79.8	80.4	82.1				75.3			73.5	69.7	78.7	69.1	71.9	71.2	67.1	79.6	69.3
HWY 6	485	82.35	-2.0	80.7	82.6	82.9	83.9			79.4	78.6	79.3		77.7	76.3	78.8	77.3	77.4	76.8	74.6	79.4	75.8
ADDICKS CLODINE		90.19	-1.8	82.5	84.5	85.1	86.3			82.3				81.5	79.2	81.5	80.2	76.5	81.8	79.3	83.2	79.7

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

¹ = Suspect elevation, low confidence in field

SUMMARY SHEET - HCFCD HIGH WATER MARKS

10/1/2020

WILLOW WATERHOLE D112-00-00

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS												
								IKE 9/13/08	4/28/09	1/9/12	4/27/13	5/26/15	10/31/15	4/18/16	01/18/17	HARVEY 08/27/17	BETA 9/21/20			
WEST BELLFORT		51.77		46.3	48.8	49.8	51.7					51.6	50.1		48.8	53.1	46.0			
WILLOWBEND	435	51.69	-2.0	47.2	49.8	50.7	52.9	47.8	43.2	49.1	48.1	51.7	49.4	50.7	48.8	53.6	46.7			
S. POST OAK		57.01		47.3	50.0	51.2	53.6					51.9	48.3		48.4	54.2	46.8			
CHIMNEY ROCK		55.00		54.0	55.7	56.3	57.5				54.2	55.3	54.1		51.9	57.1	52.4			
LANDSDOWNE	445	56.21		55.5	56.9	57.5	58.7				55.1	56.7	55.6	55.8	53.6	58.3	54.1			
HILLCROFT		56.46		56.2	58.0	58.6	59.9				57.4	58.4	56.0		54.4	58.9	54.5			

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

HWM LOCATIONS ADDED IN APRIL 2013: W BELLFORT, S POST OAK, CHIMNEY ROCK, LANDSDOWNE, HILLCROFT

¹ = Suspect elevation, low confidence in field

SUMMARY SHEET - HCFCD HIGH WATER MARKS

10/1/2020

KEEGANS BAYOU D118-00-00

ROAD NAME	STAGE GAGE	BRIDGE BM ELEV	78 TO '01 ADJUST	10.0%	2.0%	1.0%	0.2%	STORM EVENTS															
								3/4/92	10/18/94	11/17/03	IKE 9/13/08	4/28/09	1/9/12	5/12/12	5/26/15	4/18/16	1/18/17	HARVEY 8/27/17	BETA 9/21/20				
SOUTH BRAESWOOD		63.03	-1.7	58.6	60.7	61.4	63.1	61.6		62.4	58.3	60.0	61.2	59.6	62.7	61.0	60.4	64.8	57.9				
BELTWAY 8		76.38	-2.8	69.3	70.9	71.5	72.7		69.1	69.6	66.6	64.7	70.0	68.3	71.1	69.5	68.5	71.1	68.9				
ROARK	480	76.35	-2.8	72.1	73.5	74.1	75.2		73.2	73.4	69.4	68.9	73.3	72.9	74.5	74.3	73.3	74.2	72.6				
WILCREST		75.52	-2.7	74.9	76.3	76.8	77.9	74.6	75.1	75.9	71.8	71.9	75.5	75.7	76.2	75.5	74.6	76.4	74.4				
S. KIRKWOOD		78.20	-2.7	76.6	77.9	78.4	79.6	77.5		77.4	74.6	75.5	77.5	77.1	78.3	77.2	74.5	78.6	76.0				
KEEGANS	490	81.07	-2.8	78.2	79.5	79.9	80.8				75.6	75.9	78.9	77.8	80.8	80.5	78.4	80.2	78.1				
DAIRY-ASHFORD		81.29	-2.8	78.7	80.2	80.7	81.9		78.7	80.2	76.8	78.3	79.8	79.5	81.6	80.1	78.0	82.0	78.8				
SYNOTT		86.83	-2.8	80.5	82.6	83.5	85.1								82.9	81.9	80.1	82.4	80.0				
HWY 6		91.68	-2.8	82.1	84.4	85.3	87.1								84.5	82.9	80.9	84.5	81.5				
ROCKY VALLEY	495	88.36	-2.8	82.9	85.2	86.0	87.9								85.5	85.2	81.7	86.4	81.9				
RICHMOND GAINES		88.81	-2.8	84.2	87.4	88.4	89.6								85.8	83.3	80.8	86.8	82.3				

NOTE: BRIDGE AND HIGH WATER ELEVATIONS ARE ON 1988 NAVD; 2001 ADJ
SYNOTT, HWY 6, ROCKY VALLEY, AND RICHMOND GAINES ADDED IN JUNE 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.