SAN JACINTO

REGIONAL WATERSHED MASTER DRAINAGE PLAN

Harris County Flood Control District
San Jacinto River Authority
Montgomery County
City of Houston

APPENDIX B
DATA COLLECTION AND REVIEW

San Jacinto Regional Watershed Master Drainage Plan

DATA COLLECTION AND REVIEW

Prepared for

Harris County Flood Control District
San Jacinto River Authority
Montgomery County
City of Houston

by

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APPENDICES

Appendix B.1 – Field Observation Reports

1.0 Data Collection and Review

Data collection is the process of requesting, organizing, and reviewing information that was needed to complete the existing conditions flood hazard assessment as well as develop and prioritize mitigation alternatives. The data collection task included field reconnaissance efforts as well as desktop reviews of data and was performed prior to the existing conditions flood risk assessment. Collected data types included terrain data, gage information, historical high-water marks, existing models, precipitation data, historical flooding complaints, sedimentation data, historical reports, field reconnaissance, and field survey. The collected data was then compiled and reviewed to extract relevant information need for the master drainage plan.

1.1 Terrain Information

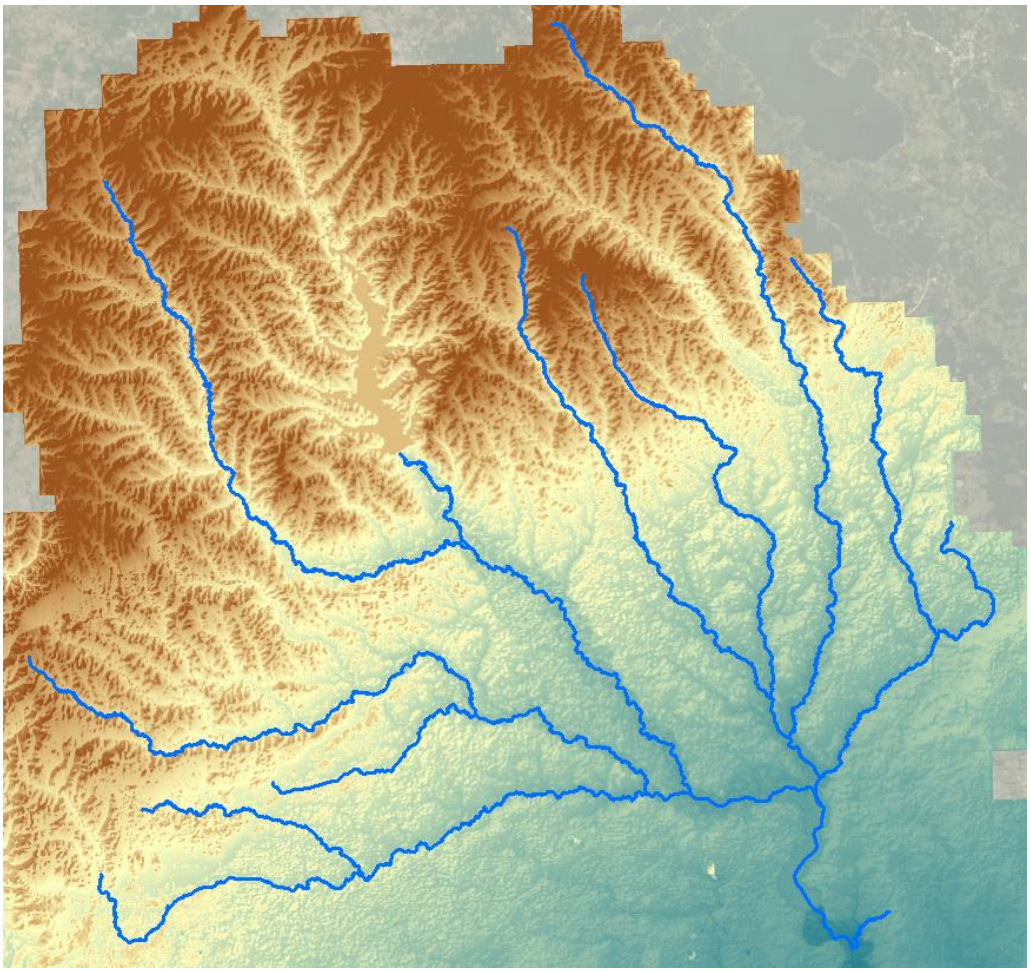
Topographic data provides a basis for the flood hazard assessment. Data were compiled from a variety of sources and combined into a seamless terrain dataset. Topographic data were collected from the following sources:

- Houston-Galveston Area Council (H-GAC)
- Texas Natural Resources Information Systems (TNRIS)
- Texas Water Development Board (TWDB)
- United States Geological Survey (USGS)

The mosaic DEM of the San Jacinto River watershed is a collection of tiles from the 2011 UTM, 2017 UTM, and the 2018 UTM and 2018 State Plane LiDAR surveys. The 2018 State Plane LiDAR was a survey of the HGAC limits (Harris County and parts of Fort Bend, Brazoria, Galveston, Liberty, Montgomery, Grimes, and Waller County) completed by Fugro Geospatial, Inc in partnership with the TWDB. Project partners include: HGAC, HCFCD and the USGS. The horizontal datum for the data is the North American Datum of 1983 (NAD83, 2011) in feet and the vertical datum is the North American Vertical Datum of 1988 (NAVD88) GEOID 12B in feet.

The combination of 2011, 2017, and 2018 UTM surveys were used to cover the remaining watersheds that complete the limits of the San Jacinto River watershed. These LiDAR surveys were commissioned through the TWDB by the Texas Strategic Mapping (StratMap) contract and are administered by the TNRIS, a division of the TWDB. The LiDAR surveys were re-projected from UTM to Texas State Plane by means of the ArcGIS 10.3.1 toolbox suite. This was a cooperative effort through the TWDB and HCFCD.

TWDB 2018 bathymetry data for Lake Conroe, Lake Houston, and the Lower West Fork of San Jacinto were also incorporated into the overall terrain dataset using ArcGIS. The extents of the terrain dataset used for this study are illustrated in **Figure 1** and **Exhibit B1**.



Note: topography falls in a southeast direction with darker colors indicating higher elevations and light and turquoise colors indicating lower elevations

Figure 1. Terrain Extents

1.2 Gage Information

A total of 27 mainstem United States Geologic Survey (USGS) flow gages are in the SJR watershed. These gages provide elevation and discharge information for each of the streams. **Table 2** provides a summary of the USGS gages within the watershed.

Table 1. USGS Gage Summary

Watershed	Streamflow Gage	USGS ID	Drainage Area (sq. mi.)	Period of Record (yrs)	Peak Discharge (cfs)	Date of Peak Discharge
Cypress Creek	Cypress at Sharp Rd.	08068700*	80.7	12	-	-
	Cypress at Katy-Hockley	08068720	110	44	12,800	8/28/2017
	Cypress at House-Hahl	08068740	131	44	22,600	8/28/2017
	Cypress at Grant Rd.	08068800	214	37	17,500	8/28/2017
	Cypress at Stuebner-Airline	08068900	248	3	23,100	8/28/2017
	Cypress at Westfield	08069000	285	75	31,500	8/28/2017
	Little Cypress at Cypress	08068780	41	37	10,200	8/18/2016
Spring Creek	Spring at Tomball	08068275	186	20	48,900	8/28/2017
	Spring at Kuykendahl	08068310	-	0.5	5,090	5/12/2019
	Spring at Spring	08068500	409	80	78,400	8/28/2017
Willow Creek	Willow at Tomball	08068325	41	28	11,200	8/28/2017
Lake Creek	Lake at Dobbin	08067690	157	2	21,200	12/08/2018
	Lake at Sendera Ranch	08067920	314	4	55,300	8/28/2017
West Fork	WFSJR at Huntsville	08067548	84.9	11	23,300	12/24/2009
	Lake Conroe	08067600*	445	22	-	-
	WFSJR below Lake Conroe	08067650	451	45	75,400	8/28/2017
	WFSJR at Conroe	08068000	282	94	122,000	8/29/2017
	WFSJR at Porter	08068090	962	34	131,000	8/29/2017
	WFSJR near Humble	08069500	1,741	9	187,000	11/26/1940
	Lake Houston	08072000*	2,828	23	-	-
	SJR near Sheldon	08072050*	2,879	12	-	-
Caney Creek	Caney at Splendora	08070500	105	75	36,500	4/9/2001
Peach Creek	Peach at Splendora	08071000	117	76	77,000	8/28/2017
East Fork	EFSJR at Coldspring	08069800	-	0	-	-
	EFSJR at Cleveland	08070000	325	80	109,000	8/28/2017
	EFSJR at New Caney	08070200	388	35	120,000	8/29/2017
Luce Bayou	Luce Bayou at Huffman	08071280	218	35	32,800	8/29/2017

*Gage height measurements only

The gages provide stage and flow information for the streams for the historical storms. At these locations the USGS measures gage height which is converted to discharge based on elevation/discharge rating curves. An initial meeting with the USGS about these gages revealed the following which will be considered during the calibration effort:

- The Upper Cypress Creek gage flows should be considered estimates due to the nature of the overflow between Cypress Creek and the Addicks/Barker watersheds. The USGS noted the peak flows once the overflow begins can be inaccurate for high flow events
- The Cypress Creek gage at Grant Road has only calculated flows during Hurricane Harvey
- The Spring Creek gage at I-45 was moved to Riley Fuzzell prior to the October 1994 gage and only returned to I-45 after the storm event. In 2014, the gage was moved to the upstream end of I-45. The gage was also overtopped during the 1994 event and therefore may lack data during the peak of the storm.
- The West Fork gage at Porter was moved to the new SH 99 crossing in early 2017.
- The West Fork gage at SH 59 only started measuring flow after Hurricane Harvey due to dredging efforts

The Harris County Flood Warning System measures rainfall amounts and monitors water levels in bayous and major streams on a real-time basis. The system relies on 177 gage stations placed throughout Harris County bayous, streams, and tributaries. The system also includes data transmitted from several partner agencies including the San Jacinto River Authority and the Texas Department of Transportation. These gages along with the other partner agency gages are shown in **Exhibit B2**. **Table 2** provides a summary of the 34 HCFCD gages within the watershed.

Table 2. Harris County Flood Warning System Gages

Watershed	Site Location	Site No.	Peak Stage	Period of Record (yrs)
Cypress Creek	FM 362	1195	226.2	8/27/2017
	Mathis Road	1190	209.3	4/18/2016
	Penick Road	1186	188.2	8/27/2017
	Katy-Hockley Road	1180	163.04	10/18/1994
	Sharp Road	1185	169.8	8/27/2017
	US 290	1175	143.5	10/18/1994
	Huffmeister Road	1170	135.3	8/27/2017
	Eldridge Parkway N.	1165	130.8	8/27/2017
	Grant Road	1160	129.8	8/27/2017
	SH 249	1150	123.4	8/27/2017
	Stuebner-Airline Road	1140	113.8	8/27/2017
	Kuykendahl Road	1130	106.5	8/27/2017
	I-45	1120	97	8/27/2017
	Cypresswood Drive	1110	80.5	8/27/2017
Little Cypress Creek	Beker Road	1230	197.8	8/27/2017
	Cypress Rosehill Road	1220	162.1	4/18/2016
	Kluge Road	1210	137	8/27/2017
Spring Creek	Hegar Road	1090	224	10/18/1994
	SH 249	1070	165.5	5/27/2016
	FM 2978	1040	160.1	6/5/2001
	Kuykendahl Road	1060	140.8	8/27/2017
	I-45	1050	111.6	10/18/1994
	SH 249	1340	163.62	4/19/1979
	Kuykendahl Road	1320	133.9	8/27/2017
San Jacinto River	FM 1485	790	81.2	8/27/2017
	US 59	760	69.6	8/27/2017
	Lake Houston Pkwy	755	56.95	8/30/2017
	Lake Houston Dam Spillway	750	53.1	8/27/2017
	US 90	720	26.7	8/27/2017
	Rio Villa	710	20.9	8/27/2017

In total, 27 USGS gages along with the 34 HCFCD stage gages were used as a primary data source in the calibration effort. It should be noted that most of these gages are in Harris County with just a few USGS gages in the watershed outside of Harris County. The areas with less gage data are predominately located upstream in the watershed. The hydrologic parameters for these upstream areas were still able to be calibrated using downstream gage data.

1.3 Historical High-Water Marks

The USGS collected over 197 high water marks for the Hurricane Harvey 2017 storm event throughout the SJR watershed for the river and many of its major tributaries. The information collected by the USGS includes the locations, surveyed elevations, description, and potential quality of the high-water mark. This data was downloaded from the USGS website as shown in **Figure 2** and was used in the analysis of the historical storm events during calibration. This data can be seen in **Exhibit B3**.

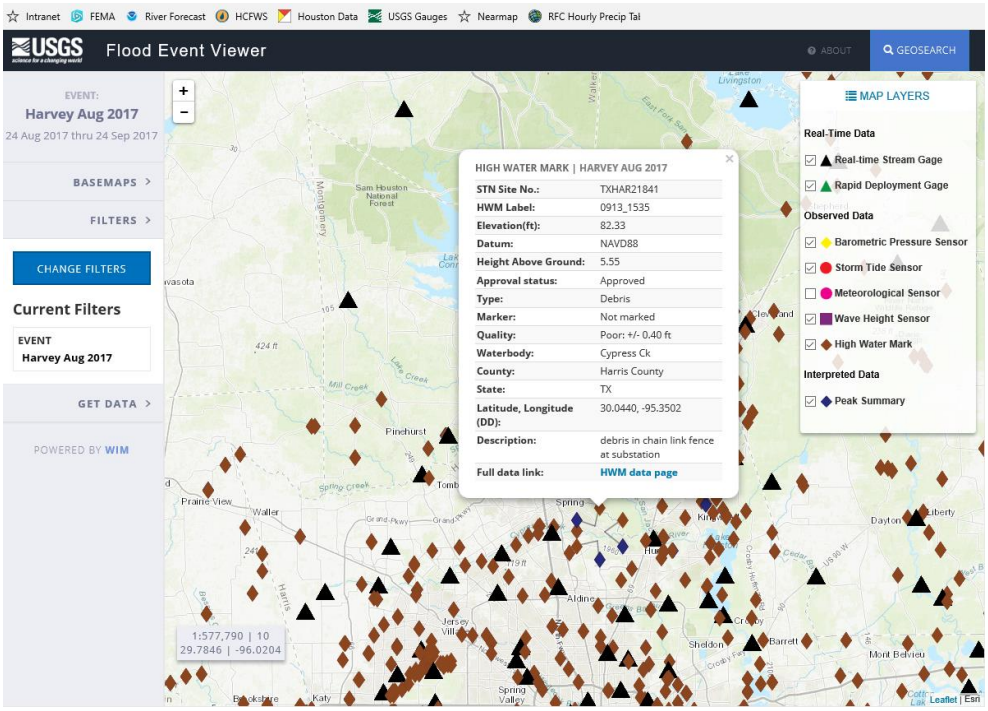


Figure 2: USGS Flood Event Viewer (https://stn.wim.usgs.gov/fev/#HarveyAug2017)

The HCFCD collected high-water marks for Harris County bayous, channels, and streams during major storm events. The high-water marks are surveyed at bridge crossings for Hurricane Harvey, May 2016, and the October 1994 storm events. The high water marks for October 1994, May 2016, and August 2017 for HCFCD creeks and rivers are included in **Table 3** through **Table 7**.

Table 3: Cypress Creek HCFCD High Water Marks

Crossing	High Water Mark Elevation (ft)		
	Oct-94	May-16	Aug-17
Cypresswood Dr	79.2	71.4	73
Treschwig	78.4	78.3	75.5
Aldine Westfield	80.8	81.7	77.6
Hardy Road	83.7	86.9	83.4
IH 45	88	90.6	85.6
Kuykendahl	99.4	101.4	96.5
Tc Jester	-	105.4	100.7
Stuebner-Airline Rd	107.9	110.3	104.2
Champion Forest Dr	110.3	112.4	105.3
Cypresswood Dr	-	115.5	111.7
Cutten	114.6	117.4	112.5
SH 249	119.4	120.3	116.8
Jones	121	122.5	119.8
Cypresswood 369B	-	125.3	121.2
Grant Road	125.4	127.4	124.2
N. Eldridge Parkway	126.1	128.6	125.4
Huffmeister Road	130	132.9	129.8
Telge Road	134.5	136.9	132.3
Barker Cypress	-	138.9	136.3
US 290	143.5	141.7	-
Fry Road	-	147.5	-
House Hahl Road	145.7	148.5	147.7
Katy HockleyRoad	163	162.3	160.5
Sharp Road	168.9	168.9	168

Table 4: Little Cypress Creek HCFCD High Water Marks

Crossing	High Water Mark Elevation (ft)		
	Oct-94	May-16	Aug-17
Kluge	136.3	135.5	137
Spring Cypress	145.3	143	145
Cypress Rosehill	159.1	161.3	161.2
Mueschke	166.8	169.7	170.2
Bauer	188.7	189.7	189.6
Becker	197.1	197.3	197.8
Roberts	204.4	204.9	204.8
Bauer-Hockley	210.1	209.3	208.4
Hegar @ L 120	216.9	219.8	219.5
Kermier @ L 120	216.7	227	225.2
Kickapoo @ L 120	238.8	237.9	237.2

Table 5: Willow Creek HCFCD High Water Marks

Crossing	High Water Mark Elevation (ft)		
	Oct-94	May-16	Aug-17
Gosling Rd	122.3	115.4	122.8
Kuykendahl	127.8	130.1	133.9
FM 2920	140.7	141	143.5
Huffsmith Kohrville	150.4	150.5	152.3
SH 249	157.7	158	159.1
Telge Rd	160.3	162	161.2
Cypress Rosehill	167.2	167	165.7

Table 6: Spring Creek HCFCD High Water Marks

Crossing	High Water Mark Elevation (ft)		
	Oct-94	May-16	Aug-17
End of Lee Rd	79.5	71.2	71.2
Riley Fuzzel Rd	104.1	97.5	100.5
IH 45	111.6	108.5	111.4
Kuykendahl	-	140.1	140.8
FM 2978	155.1	153.4	154.3
SH 249	162.2	165.5	163.9
Cypress Rose-Decker	180.3	175.9	174.7
Mueschke Rd	-	-	186.6
Cardinal Rd	192.3	187.3	190.3
Roberts Cem-Rd	193.3	189.9	192
Nichols	211.3	208.3	209.4
Hegar Rd	224	222.2	222.9
Margerstadt	236.1	234.4	233.3
Kickapoo Rd	245.7	244	244
Field Store Rd	-	257.9	258.3
FM 1488	276.8	275.7	275.1

Table 7: San Jacinto River HCFCD High Water Marks

Crossing	High Water Mark Elevation (ft)		
	Oct-94	May-16	Aug-17
IH-10 East	-	8.6	16
Rio Villa Subdivision	-	12.2	20.9
US 90	24.6	18.1	26.7
Old US 90	28.1	19.4	29.3
Lake Houston Spillway	52.3	47.8	53.1
W Lake Houston Parkway	53.7	51.1	57
US 59	66.7	61.9	69.6
Hamblen @ Loop 494	-	61.5	65.5
E. Fork San Jac. @ FM 1485	76.2	69.5	81.2

1.4 Existing Models

Five of the eleven streams are located within the bounds of the HCFCD which has developed and maintains a model inventory for their major creeks and bayous. HCFCD has hydrologic and hydraulic models for Cypress Creek, Little Cypress Creek, Willow Creek, Spring Creek, and Jackson which are used by HCFCD for both new development and project planning. The models were based on the HCFCD standard hydrologic and hydraulic parameters and methodology for steady state modeling. Each model was obtained from the HCFCD M3 website (m3models.org). The HCFCD models for these streams were used as a basis for the study.

1.4.1 Cypress Creek

The Cypress Creek hydrologic model includes 78 subbasins and 48 routing reaches modeled in HEC-HMS version 3.4. Peak flows in Cypress Creek for the effective 1% annual exceedance probability (AEP) storm event range from 4,000 cfs after the Cypress Overflow to 30,000 cfs near the confluence with Spring Creek.

The Cypress Creek hydraulic model includes 351 cross sections and 39 bridge/culvert crossings from upstream of the Harris and Waller County line to the confluence with Spring Creek modeled in HEC-RAS version 3.0.1. The water surface elevations for the 1% AEP storm ranged from 185 feet at the headwaters to 70 feet at the confluence.

1.4.2 Willow Creek

The Willow Creek hydrologic model includes 25 subbasins and 14 routing reaches modeled in HEC-HMS version 3.3. Peak flows in Willow Creek for the effective 1% AEP storm event range from 1,400 cfs at the headwaters to 11,000 cfs near the confluence with Spring Creek.

The Willow Creek hydraulic model includes 176 cross sections and 24 bridge/culvert crossings from upstream of Juergon road to the confluence with Spring Creek modeled in HEC-RAS version 3.0.1. The water surface elevations for the 1% AEP storm ranged from 201 feet at the headwaters to 107 feet at the confluence.

1.4.3 Spring Creek

The Spring Creek hydrologic model includes 34 subbasins and 23 routing reaches modeled in HEC-HMS version 3.3. Peak flows in Spring Creek for the effective 1% AEP storm event range from 4,600 cfs at the headwaters to 76,600 cfs at the confluence with West Fork San Jacinto River.

The Spring Creek hydraulic model includes 393 cross sections and 24 bridge/culvert crossings from upstream of FM 1736 to the confluence of West Fork San Jacinto in HEC-RAS version 3.0.1. The water surface elevations for the 1% AEP storm ranged from 290 feet at the headwaters to 67 feet at the confluence of West Fork San Jacinto River.

1.4.4 Jackson Bayou

The Jackson Bayou hydrologic model includes 20 subbasins and 12 routing reaches modeled in HEC-HMS version 3.3. Peak flows in Jackson Bayou for the effective 1% AEP storm event range from 2,300 cfs at the

headwaters of R102-00-00 and 1,300 cfs at the headwaters of R100-00-00 to 14,800 cfs near the confluence with the San Jacinto River.

The Jackson Bayou hydraulic model includes 75 cross sections and 9 bridge/culvert crossings from Ramsey Road to the confluence with the San Jacinto River in HEC-RAS version 3.0.1. The water surface elevations for the 1% AEP storm ranged from 49 feet to 11 feet. The R102-00-00 hydraulic model includes 53 cross sections and 4 bridge/culvert crossings from upstream of Stroker Road to the confluence with Jackson Bayou. The water surface elevations for the 1% AEP storm ranged from 59 feet at the headwaters to 20 feet at the confluence with Jackson Bayou.

1.4.5 West Fork San Jacinto River (Lake Conroe Watershed)

The San Jacinto River Authority along with Montgomery County and the City of Conroe developed hydrologic and hydraulic models for the Lake Conroe watershed from the headwaters near Huntsville to the confluence with Lake Creek as part of the West Fork San Jacinto River Flood Protection Planning Study. The hydrologic model developed in HEC-HMS 4.2.1 included 37 subbasins and 20 routing reaches for flows in the watershed. The hydrologic model was calibrated to two historical storm events, Hurricane Harvey and Memorial Day 2016.

The study also included a calibrated West Fork San Jacinto River model from downstream of the Lake Conroe dam to the bridge crossing at I-45 developed in HEC-RAS 5.0.3. The model included 78 cross sections and three bridge structures.

1.5 Precipitation Data

The National Oceanic Atmospheric Administration (NOAA) published the Precipitation-Frequency Atlas of the United States Volume 11, Texas (Atlas 14) in 2018 which provides the precipitation frequency estimates for storm events based on the latest rainfall information. Rainfall depths for each watershed for each watershed using the ESRI ArcGIS Desktop *Zonal Statistics as Table* tool. This tool summarizes raster cell values within the boundaries of a set of polygons.

Partial-duration precipitation-frequency (PF) estimate rasters were downloaded from NOAA's website (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_gis.html) from the 50% AEP/5-minute raster up to the 0.2% AEP/24-hour raster.

The mean value of each raster was then summarized using the basin shapefile for each watershed. The basins included West Fork San Jacinto River-Conroe Lake, Caney Creek-Lake Creek, Crystal Creek-West Fork San Jacinto River, Frontal Lake Houston, Little Cypress Creek-Cypress Creek, Walnut Creek-Spring Creek, Peach Creek-Caney Creek, Tarkington Bayou-Luce Bayou, and Winters Bayou-East Fork San Jacinto River.

1.6 Historical Flooding Complaints

The HCFCD and Montgomery County provided a GIS inventory of damaged structures identified in the April 2016, May 2016 and August 2017 storm events. The information included the location and address of the damaged structure. The data provided by the two entities includes over 10,000 damaged structures within the study area. Most of these structures are located on the main river floodplains included in this master drainage plan. Using the information, 12 damage centers were identified based on the location and

concentration of the damaged structures. The damage centers are summarized in **Table 8** and shown in the heat map provided in **Figure 3**. **Exhibit 6** shows the flood claims per square mile for the watershed.

Table 8: Watershed Damage Centers

Damage Center ID	Watershed	Location
1	Spring Creek	Woodlands near Panther Branch
2	Spring Creek	Spring near Rayford Rd.
3	Caney Creek	New Caney
4	San Jacinto River	Interstate 10
5	West Fork San Jacinto	Lake Conroe Walton
6	West Fork San Jacinto	Conroe near I-45
7	West Fork San Jacinto	Porter south of FM 242
8	West Fork San Jacinto	Porter near HWY 59
9	Peach Creek	Patton Village near HWY 59
10	West Fork San Jacinto	Kingwood
11	Cypress Creek	Upstream of SH 249
12	Cypress Creek	Near Kuykendahl

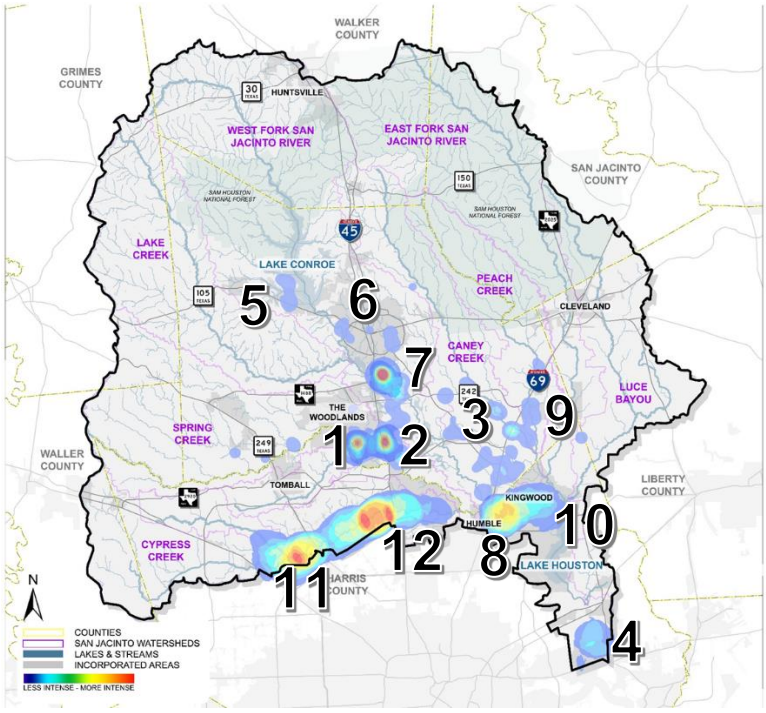


Figure 3: Montgomery and Harris County 2016 and 2017 Damage Centers

1.7 Sedimentation Data

One of the key strategies that will be evaluated to help reduce flood risk is the development and implementation of a maintenance plan to help control sedimentation and vegetative growth along the major streams in the San Jacinto River watershed. As part of that effort, existing sedimentation studies were reviewed and analyzed. The full sedimentation plan is presented in **Appendix F**.

Sixteen reports that contained information regarding sedimentation or the factors that contribute to it within the SJR watershed were obtained and reviewed to determine the potential impacts of sedimentation in the region. The provided reports were parsed into three categories: sediment (twelve reports), hydraulics (two reports), and digital elevation models (two reports). Sediment reports were further subdivided into a sediment measurement subcategory (seven reports) and a sediment management subcategory (five reports). The former subcategory contained information on field measurements (e.g., bathymetry or extent of dredging) while the latter summarized the relationship of sediment accumulation, flood risk, and sediment management alternatives.

The bulk of the provided reports focused on Lake Houston and the West Fork San Jacinto River. For the development of this Strategic Sediment Plan, the West Fork begins approximately one-half mile upstream of US Highway 59 and extends downstream to one-half mile upstream of the FM 1960 bridge over Lake Houston. This definition mirrors the definition used in the 2018 TWDB bathymetric survey of the West Fork.

In general, these previous studies have identified the amount and rate of sedimentation in Lake Houston. Some studies have linked sedimentation to an increased flood risk along the West Fork San Jacinto River. The modeled increases to the 1% AEP flood risk have ranged from minor (0.2’ rise in the base flood elevation) to moderate (1.2’ rise in the base flood elevation). These studies suggest that this sedimentation will continue in perpetuity unless addressed. A brief narrative summary for each report is presented below.

1.7.1 Sediment Measurement Reports

Tetra Tech 2019. *Lake Houston Sub-bottom Profiling and Coring, Final Report*. Prepared by Tetra Tech, April 5, 2019.

Summary of methods and findings for cores taken near the Kings River Estates (0.5 mile upstream of FM 1960 and 1.0 mile downstream of West Lake Houston Parkway) used to document the volume of sediments from Harvey. Comparisons made to 2011 sediment core finding completed by TWDB. Notable deposition of fine to medium grain sand found with silty and clay underneath. Sand wedge ranged from 0.5’ to 5.0’ thickness and thinned to the south. Volume of surficial sediment deposited (including mouth bar) ranged between 1M cubic yards (CY) and 1.5M CY depending on methodology.

TWDB 2013*. Volumetric and Sedimentation Survey of Lake Houston: December 2011 Survey*. Prepared by Texas Water Development Board, July 2013.

Bathymetric survey of Lake Houston. This survey noted sedimentation rates in Lake Houston, including the West Fork and East Fork, of between 344 and 689 acre-feet per year. Core samples were obtained.

TWDB 2018a. *Bathymetric Survey of the West Fork San Jacinto River: June 2018 Survey*. Prepared by Texas Water Development Board, July 2018.

A report of methodology and findings for a bathymetric survey for the West Fork San Jacinto River completed by TWDB. The West Fork San Jacinto River bathymetric study encompasses approximately 9 miles of the river between approximately one-half mile upstream of FM 1960 to approximately one-half mile upstream of U.S. Highway 59.

TWDB 2019. *Volumetric and Sedimentation Survey of Lake Houston: June 2018 Survey.* Prepared by Texas Water Development Board, April 2019.

A summary of a bathymetric survey of Lake Houston. The summary contains a comparative Total Capacity table, but exact numbers are unreliable. A downward trend in the lake's capacity since its original design in 1966 is documented in Table 3, with a total reduction of approximately 19% at approximately 384 acre-ft per year, with future trends toward 444 acre-ft per year. The report provided 12 monitoring sections to measure sediment accumulation. These monitoring sections did not include the islands upstream of the FM 1960 bridge.

USACE 2019. *West Fork San Jacinto River Emergency Dredging Status Sheet*. Prepared by US Army Corps of Engineers, March 2019.

A status update of dredging progress.

1.7.2 Sediment Management Reports

TCB 1983. *Sediment Evaluation of Lake Houston for the City of Houston*. Prepared by Turner Collie & Braden, October 1983.

Summary of cross section measurements in West Fork, East Fork and Lake Houston. These cross sections were tied into the sections of Report 10 (1966). The Universal Soil Loss Equation (USLE) was used to evaluate total soil loss by land use. This study referred to a previous study "Suspended Sediment Load of Texas Streams" completed by the TDWR in 1975 which listed an average sediment loading rate of 155 acre-ft, ranging from 82 acre-ft to 283 acre-ft for the entire lake, including the West and East Forks of the San Jacinto River. This assumes a dry unit weight of 52 lbs/ft^3. This study measured the total loss of volume in Lake Houston due to sedimentation as 311 acre-ft per year for the 28 years since it was built. This is reasonably close to the USLE calculation prediction of 165.9×10^6 kg/year, assuming the same dry unit weight. The report listed 18 active sand and gravel mines on the West Fork and 5 on the East Fork. The report also predicted that the doubling of population by 2000 would rapidly increase urbanization in the Spring and Cypress Creek watersheds and increase sedimentation to Lake Houston. The report stated that upstream measures should be taken (pages IV-4 to IV-10) as dredging the lake to design conditions would be cost-prohibitive. No core sampling was conducted as part of this report.

BRI 2000. *Regional Flood Protection Study for Lake Houston Watershed Flood Program: Technical Report for City of Houston, Harris County Flood Control District, San Jacinto River Authority, and Texas Water Development Board.* Prepared by Brown and Root, Inc, 2000.

A summary of methods and findings of a hydraulic analysis of the study area, sedimentation survey, calculated annual suspended sediment loads, and comparison to historic annual sediment loads and

impacts of sediments to 1% AEP flood elevations. Identified flood impacts from sedimentation occurring at FEMA Locations B, C, F, G, and H (page 31) with BFE increases ranging from 0.18' to 1.1' (downstream of SH 59 bridge to GM 1960 bridge). The report noted a reduction in total cross section area between the FM 1960 bridge and FEMA section A at Kings River Estates; sedimentation in this area totaled 7,500 acre-ft per 2.7 mile at a rate of 350 acre-feet per year. Sedimentation between FEMA sections A and E (near Hamblen Road in River Grove Park) totaled 3,100 acre-ft per 3.5-mile at a rate of 160 acre-ft/year. Findings showed no accumulation at four bridges, including the Southern Pacific railroad bridge.

Coarser sand solids may account for as much as 70% to 80% of the total sediment load during large storms (page 51). The study also reviewed TSS measurements from previous studies to note the mass of historic annual sediment load, obtained TSS measurements from USGS gages, and calculated sediment transport curves.

Recommendations fell into three categories: Dredging, trapping, and channel improvements. Hydraulic findings show that sediment removal upstream of FM 1960 will have a minimal effect due to the backwater condition from Lake Houston, with minor reductions near Lake Houston parkway bridge (0.58') and between FEMA sections A and D (0.11' to 0.52'). Regular maintenance has the largest benefit between the Lake Houston Parkway bridge and Lake Houston. This maintenance would include channel improvements between RM 10.1 and 13.6 (from FEMA section A to near FEMA section E), to be coupled with selected dredging and on-channel sediment basins. On-channel sediment basins capture sediment effective "trapping" them in place until they can be removed. The report also recommended monitoring dominant sediment movements and exploring the use of existing sand pits upstream of the US Route 59 bridge as off-channel sediment basins. The report also included a market analysis for material to be captured/dredged.

ERDC 2018. *West Fork of the San Jacinto River Field Investigation and Preliminary Geomorphic Assessment*. Prepared by USACE ERDC Coastal Hydraulics Laboratory, May 2018.
A report focusing on a field investigation of channel plan form and resulting channel response between US 69 and downstream to ~1.0 mile downstream of W Lake Houston Parkway. Objectives included (1) identify geomorphic processes responsible for the observed flooding and sedimentation problems, (2) identify potential alternatives to address these problems, and (3) make recommendations for future studies required to develop comprehensive plans for the system.

HCFCD 2019. *Sediment Removal and Drainage System Repairs in Precinct 2.* Prepared by Harris County Flood Control District; Accessed 8/1/2019.
Description of project locations to repair erosion and for shoaling for Armand Bayou, Greens Bayou, Jackson Bayou, Spring Gully, Goose Creek, and Luce Bayou.

1.7.3 Digital Elevation Models

TWDB 2011. *TIN Models for Lake Houston 1994 Survey Boundary (Re-calculated) and 2011 Survey Boundary.* Prepared by Texas Water Development Board, 2011.
Raster GIS file containing digital information regarding the topography of the channel bed survey. This survey did not include above water topography.

TWDB 2018b. *TIN Models for Lake Houston 2018 Survey Boundary.* Prepared by Texas Water Development Board, 2018.
Raster GIS file containing digital information regarding the topography of the channel bed survey. This survey did include select above water topography in the downstream reach of the study area.

1.7.4 Hydraulic Reports

WS 1985. *San Jacinto Upper Watershed Drainage Improvement and Flood Control Planning Study for Texas Department of Water Resources and San Jacinto River Authority*. Prepared by Wayne Smith and Associates, September 9, 1985.
A hydraulics-based design report that discussed urbanization impacts on hydrology. The report includes little to no mention of sediments in design consideration, nor mention of the impacts design may have on channel response such as degradation or aggradation. The report recommended de-snagging (page 12) of all trees/brushes larger than 4" on the stream banks in order to speed up water along primary channel but did not discuss how this may impact channel response.

SJRA 1957. *Master Plan Report for the Full-Scale Development of the San Jacinto River*. Prepared by San Jacinto River Authority, 1957.
This report observed that many lands within the San Jacinto watershed were recurrently inundated and overflowed and recommended construction of dams as part of a soil conservation and reclamation program (page 21). To control run-off of storm and flood waters, a joint plan among multiple agencies was created to construct drainage ditches, water diversions, and levees throughout the watershed starting in 1946. This report recommended improvements (page 22) in the fertility of previously inundated lands. Previous agricultural practices included raising cotton, but many farms were so badly eroded that they could not remain profitable (page 22). The report also documents reforestation of dormant agricultural land (page 23).

1.8 Drainage Study Reports

Several historical drainage studies that focused on identifying existing flood risk and evaluating flood risk reduction alternatives within the San Jacinto River watershed were provided by the planning partners. The reports included both analysis of the existing conditions watershed and potential mitigation alternatives to improve flood risk, manage the regions water supply, and determine the impacts of sedimentation. The previous reports provide a comprehensive understanding of the purpose and goals of past studies and identified proposed alternatives that were previously considered. The reports assisted in the development and evaluation of flood mitigation alternatives as part of master drainage plan. Each report was reviewed

for pertinent information related to the master drainage plan, the alternatives considered and evaluated, and final recommendations.

1.8.1 Master Plan Report for the Full-Scale Development of the San Jacinto River (1943)

The initial master plan for the SJRA documented the need for a comprehensive assessment of flooding risk after devastating floods in the San Jacinto River watershed caused extensive damage to property and agricultural lands. The master plan was prepared with the goal being the protection and maximum utilization of land while accounting for sustainable growth and development within the watershed. The master plan for the watershed was developed to address short-term and long-term flooding issues focusing on five key priorities of the SJRA, which included:

1) flood control and protection of navigation,
2) water supply,
3) soil conversation and reclamation of land,
4) reforestation, and
5) recreation

The creation of a series of dams and reservoirs along with channel improvements and levee construction were considered to reduce flood risk and minimize future loss of life and property. A total of 14 dams were proposed that would provide approximately 886,000 acre-feet of available storage (both for water supply and flood mitigation) with an estimated cost of $22,200,000 (not accounting for inflation). Roughly $1,000,000 (not accounting for inflation) of channel improvements were also proposed. The general locations of these dams and channel improvements are shown in **Figure 4**.

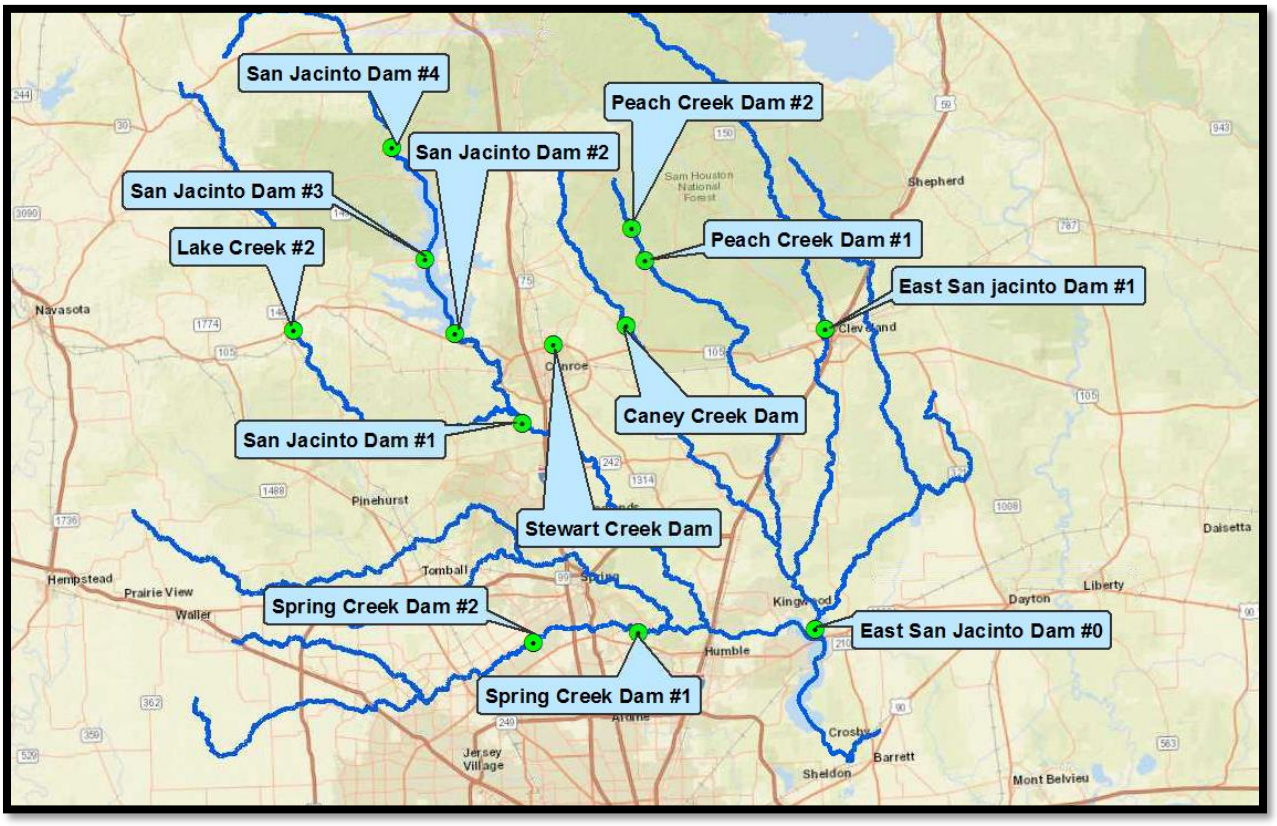


Figure 4. Proposed Alternatives from 1943 Master Plan Report Locations

1.8.2 Master Plan Report for the Full-Scale Development of the San Jacinto River (1957)

The 1957 report was an update to the existing 1943 watershed master plan report and describes the repetitive flooding that occurred within the San Jacinto River watershed and states the importance of investigating flood risk reduction measures while working to provide multiple benefits through the preservation and managed utilization of the natural resources throughout the entire watershed. The expected industrial growth within the watershed was discussed as well as the need for water supply planning. The implementation of drainage improvements was suggested to reduce the extents of ponding and thereby minimize future loss of land productivity. Similar alternatives as outlined in the 1943 report were discussed and a detailed list of alternatives and estimated cost. A location map of the proposed alternatives is provided as **Figure 5**.

Figure 5. Proposed Alternatives Graphic from 1957 Master Plan Report

1.8.3 San Jacinto Upper Watershed Drainage Improvement and Flood Control Planning Study (1985)

The 1985 planning study was the first study that focused on a detailed evaluation of proposed alternatives. While the study provided a summary of existing flood risk and documented the need for a regional drainage study as previous studies had done, the 1985 study was the first to incorporate detailed hydraulic modeling of alternatives to evaluate both their feasibility but also their effectiveness in reducing flood risk.

The study first described the flat topography in the southern and eastern parts of the watershed that contributes to reduced conveyance capacity in the major existing streams. Significant rainfall depths of recent storm events and rapid urbanization occurring within the watershed highlighted the importance of performing a detailed, comprehensive flood control study and preparing recommendations for flood risk reduction alternatives that could be implemented in the future. The report describes the primary streams throughout the watershed have been minimally altered from their natural state. The natural state of these channels combined with flat slopes resulted in insufficient capacity to convey existing conditions flows for both frequent and major storm events.

The report presented background information, such as a description of the existing floodplain extents and predominant soil types, for each major stream within the San Jacinto watershed. Approximately 2,200 structures were identified within the 1% AEP floodplain of the major streams (excluding Luce Bayou) within the San Jacinto River watershed. Estimated damages accounting for both more frequent (50% AEP) and less frequent (1% AEP) storm events was calculated at roughly $6.9 million, with most damages occurring along the West Fork and Peach Creek.

Several alternatives were considered and evaluated, including both structural and nonstructural improvements to reduce existing flooding damages and widespread ponding. The alternatives that were considered included the following:

1. Total Channelization (with channel deepening to reduce needed ROW)
2. Selective Channelization (maintain existing channel bottom with possible levees)
3. Vegetation Clearing (clearing heavy vegetation from channel banks and overbank areas)
4. Bridge Modifications (construct larger bridge to reduce HGL losses across the structure)
5. Property Buy-outs
6. Lake/Reservoir Creation

The location and classification of proposed improvements are illustrated in **Figure 6**.

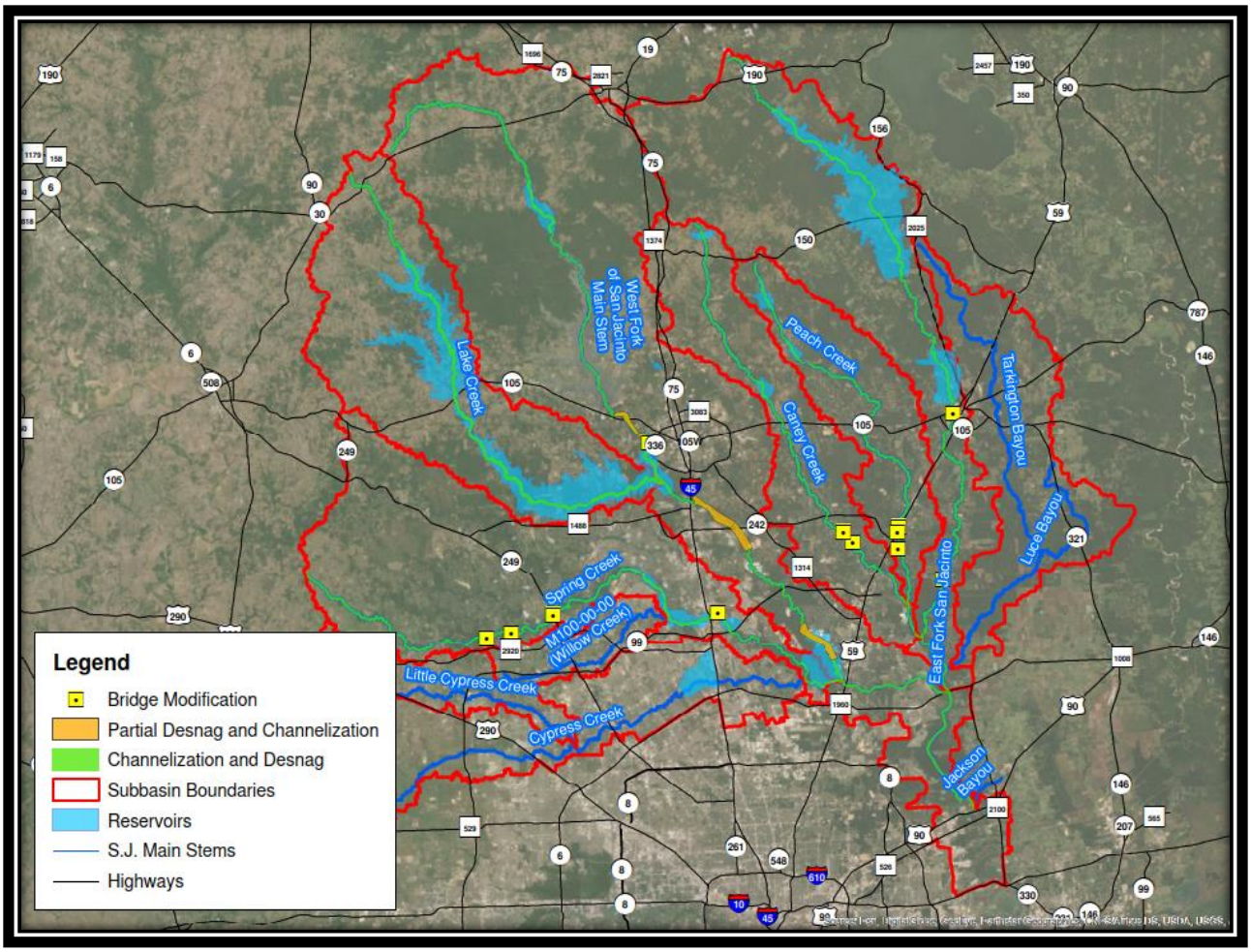


Figure 6. Alternatives Shown by Improvement from 1985 Report

The alternatives were evaluated by developing hydrologic models using either TR-20 or HEC-1 and hydraulic models using either WSP2 or HEC-2. The resulting WSELs under the different proposed conditions scenarios were compared to existing conditions to assess the potential for flood risk reduction. Cost estimates and benefit/cost calculations were prepared for use in the evaluation and prioritization of different alternatives.

The alternatives were evaluated based on the reduction of the 1% AEP water surface elevation and the benefit/cost ratio calculated based on USACE economic assumptions. The report stated that the benefit/cost ratios for the various studied improvements varied greatly with total channelization, bridge modification, and most vegetation clearing appearing less feasible while property buy-outs and construction of reservoirs appearing the be more cost-effective solutions. A summary of the benefit/cost ratios calculated for the evaluated alternatives is provided below in **Figure 7**.

Basin	Total Channelization	Desnag	Reservoirs Alt. 1	Reservoirs Alt. 2	100-yr Buyout	25-yr Buyout
West Fork	0.40	0.75	2.2[1]	2.8[2]	0.57	0.76
Lake Creek	<0.001	0.0	0.0[1]	<0.001[3]	0.09	0.09
Spring Creek	0.03	0.14	0.0	0.09	0.36	0.84
Peach Creek	0.33	0.04	0.80	0.40	1.3	1.9
Caney Creek	0.09	0.08	0.51	——	1.2	2.7
East Fork	0.07	0.002	0.07	——	0.77	0.81

[1] = Lake Creek Reservoir operated for controlling West Fork floods.
[2] = Lake Creek Reservoir and new Lake Conroe operation assumption.
[3] = Lake Creek Reservoir operated for controlling Lake Creek floods.

Figure 7. Summary of Benefit/Cost Ratios for Evaluated Alternative from 1985 Report

Some of the key highlights from the report conclusion included the following:

- Total channelization provided the largest WSEL reduction based on 1% AEP LOS improvements but at a relatively high cost and larger environmental impact. Lower LOS channelization may yield a higher benefit/cost ratio and become more feasible.
- Selective channelization had higher benefit/cost ratios since the costs were more focused on the damage-prone areas.
- Vegetation clearing had minimal WSEL reduction benefit but also substantially lower cost; however, no environmental impacts were considered as part of this study.
- Bridge modifications benefits were only observed near the structures with relatively high estimated costs.
- Buyouts were evaluated for both the 4% AEP and 1% AEP floodplains. Although the 1% AEP buy-outs resulted in overall higher damage reduction, the buyouts for the 4% AEP floodplain had superior benefit/cost ratios indicating that most damages were caused by more frequent storm events.
- Reservoir alternatives included larger, multi-purpose reservoirs (Lake Creek and East Fork) as well as dry flood control reservoirs (Peach and Caney Creek) designed to function like the Addicks and Barker Reservoirs in Houston. The reservoirs generally had some of the highest benefit/cost ratios among the alternatives due to their significant damage reduction that offset some of the high construction costs.

1.8.4 Comprehensive Flood Protection Plan for Southern Montgomery County, Texas (1989)

The comprehensive flood protection plan for smaller areas of south Montgomery County that determined the existing flood problems, proposed flood reduction alternatives and recommended the preferred improvements. The study area is located between the Woodlands and the West Fork of the San Jacinto River, and includes many smaller tributaries of the West Fork and Spring Creek, as shown in **Figure 8**.

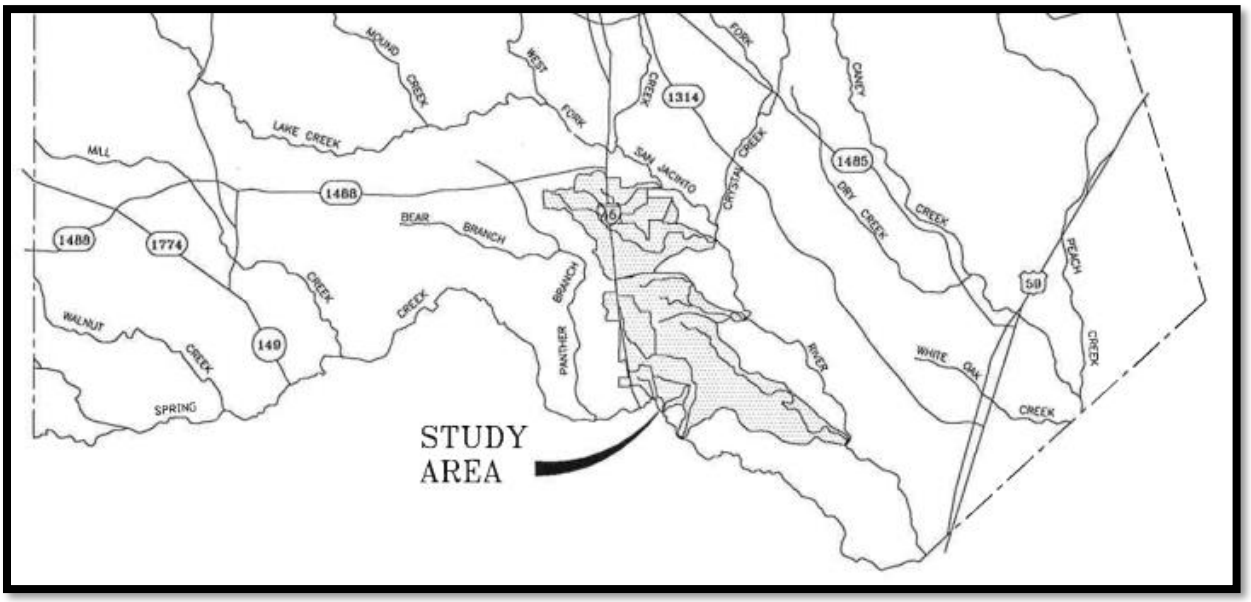


Figure 8. Study Area for Southern Montgomery County 1989 Study

Several problems contributing to existing drainage were outlined such as limited channel ROW, non-uniform and inadequate channel geometry, poor channel conditions due to lack of proper maintenance, and roadway hydraulic structures with insufficient conveyance capacity. Both nonstructural (property buy-outs) and structural alternatives (bridge and channel improvements) were considered. Four interim alternatives consisting of structural channel improvements with an estimated cost of roughly $18 million were evaluated. Since property buy-out costs were estimated to have a higher cost, the interim channel improvements were recommended. Ultimate improvements designed to handle full-developed conditions with an estimated additional cost of $41.6 million.

A benefit/cost analysis of the alternatives and calculation of a drainage impact fee were also performed as part of the study. The report noted that the no increases in 1% AEP peak flows were shown for the ultimate improvements, but that downstream 1% AEP flow rates were not significantly affected by either the interim or ultimate improvements. Coordination among agencies regarding funding and project approval, long-term watershed planning, and effective maintenance were all listed as critical to the successful implementation of the recommended alternatives.

The alternatives analyzed and recommended in this report address localized flooding in South Montgomery County offset of the major rivers. Since the alternatives do not have any major impacts on the main stream flooding, the alternatives will not be explored as part of the primary flood mitigation planning.

1.8.5 Lake Creek Reservoir Report (1997)

The SJRA in cooperation with the Bureau of Reclamation studied the possibility of building a reservoir on the lower portion of Lake Creek, as shown in **Figure 9**.

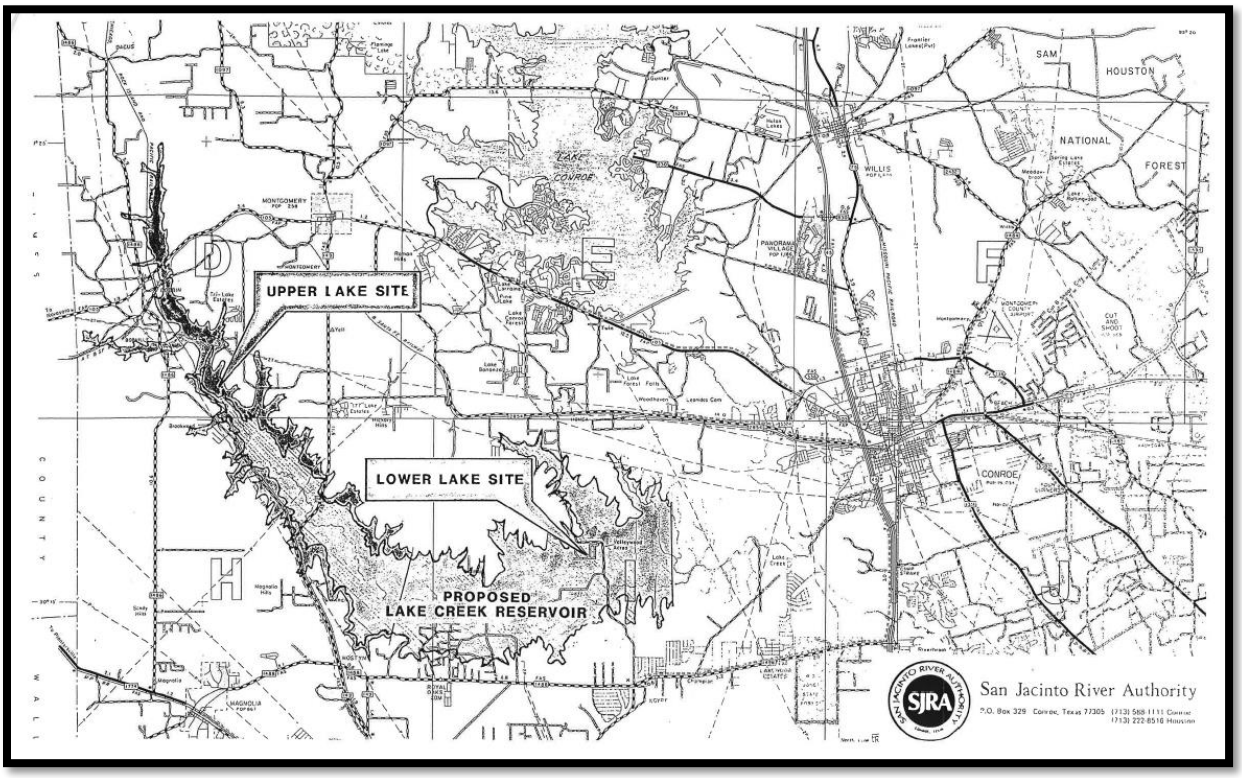


Figure 9. Proposed Lake Creek Reservoir Location from 1997 Report

The proposed reservoir would be roughly 80% of the size of Lake Conroe and yield about 60% of the Lake Conroe water supply. The purpose of the reservoir would be to increase the surface water supply for the region and at the time did not provide any floodplain mitigation. The estimated cost of the reservoir was $275 million. Since no federal or state funding was available, potential water sales contracts were used to assess feasibility and determine if funding for the reservoir construction could be obtained. Due to a lack of responses and little interest in water sales, plans for the reservoir were not further pursued.

1.8.6 Regional Flood Protection Study for Lake Houston Watershed Program (2000)

The Regional Flood Protection Study included an evaluation of flooding near Lake Houston and an evaluation of flood reduction alternatives to reduce flood risk. Rapid urbanization in the watershed since the 1970s had resulted in significant transformation of undeveloped land into residential and commercial areas. Heavy rainfall in the 1990s caused widespread flooding and severe erosion along the San Jacinto River. Sedimentation was expected to have contributed to flooding, so a study was initiated in 1997 to investigate sedimentation issues and evaluate methods to control future flood damages. A comparison of

1999 survey data to the FEMA model cross-sections showed significant loss of storage with scouring observed in narrower channels upstream and sedimentation observed in wider channels in the lower reaches of the watershed. The limits of the study are shown in **Figure 10**.

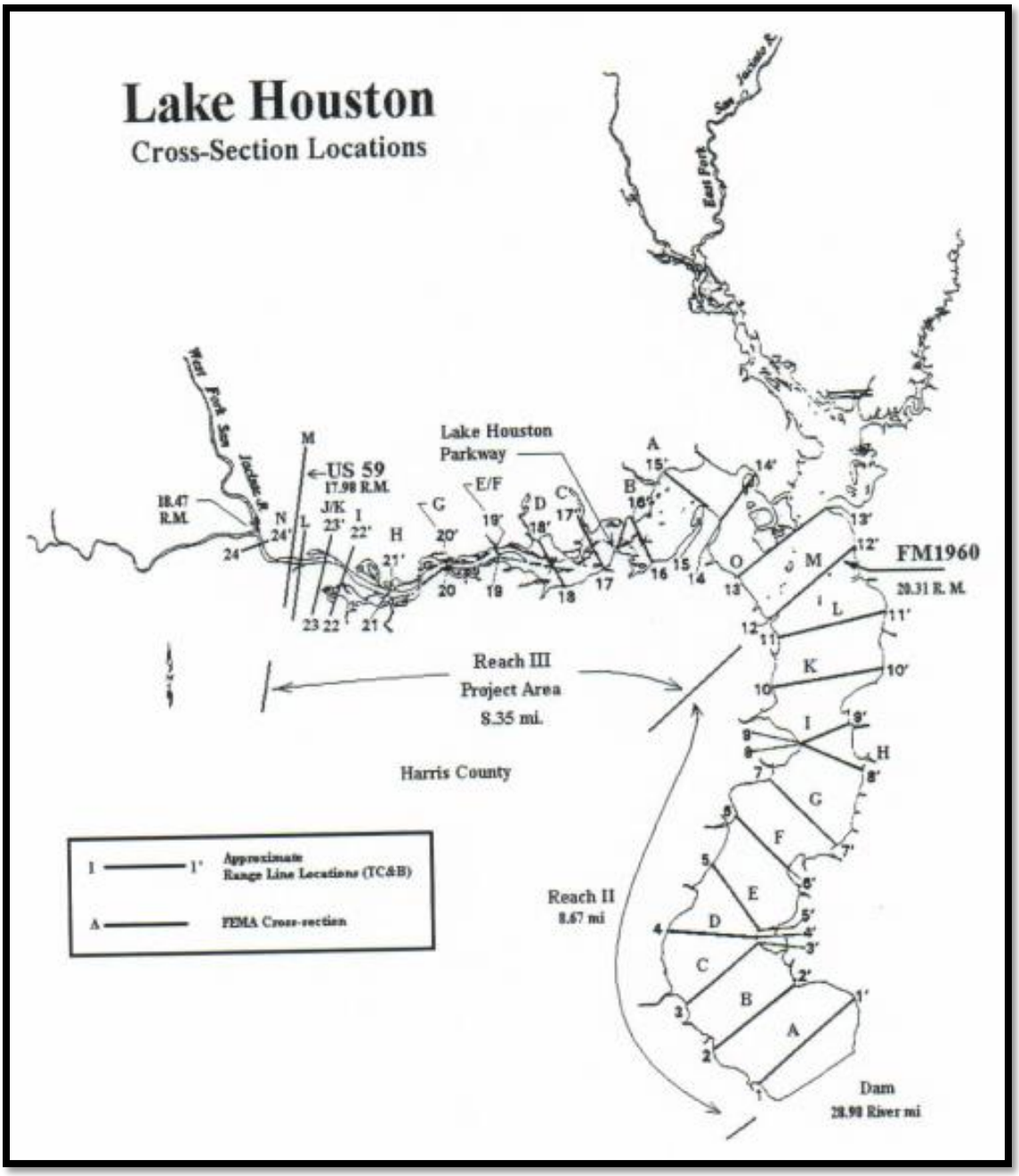


Figure 10. Cross-Section Locations from 2000 Lake Houston Study

The results of a HEC-2 hydraulic analysis demonstrated WSEL increases of approximately 1-2 feet relative to the FEMA model; changes to the 1% AEP floodplain were mostly attributed to better modeling methods and newer terrain data.

Flood control alternatives that were considered included levees, conveyance improvements, regional detention, and property buy-outs. Channel improvements, selected dredging, and on-channel/off-channel sedimentation basins were evaluated through hydraulic modeling. Channel enlargement, primarily through the removal of existing sediment buildup, was found to be one of the more practical, cost-effective solutions. The need for further coordination with multiple stakeholders within the watershed and evaluation of environmental constraints and permitting requirements was highlighted. Key conclusions of the study include the following:

- Channel improvements along the Lower West Fork (upstream of Lake Houston Parkway) provided a minimal reduction of 1% AEP WSEL (< 0.6 feet) but with a relatively high estimated cost of $30 million.
- Flood control measures required to reduce damage for majority of structures would involve major channel modification or large regional detention basins with high costs ($50-100 million).
- Selective dredging (Alternative II) with an estimated cost of $10 million was found to be the most effective by reducing the 1% AEP WSEL near Lake Houston Parkway 0.3-0.4 feet and returning the WSELs further upstream back to the FEMA 1970s model condition.
- To address long-term sedimentation concerns, sedimentation basins need to be considered; several locations (both on- and off-channel) were considered with the potential to trap the majority of incoming sediment load but further analysis was recommended.
- Property buy-outs were deemed a cost-effective way to reduce damages; the buy-out properties are primarily located in the upper West Fork channel with cost of $22 million.
- Since the backwater from Lake Houston was suggested as a contributor to flooding, additional H&H studies of Lake Houston were recommended along with more detailed sedimentation studies and regional floodplain management and mitigation planning

1.8.7 Spring Creek & West Fork Study – Estimating Land Cover Effects on Selected Watersheds (2019)

The objective of this study was to estimate the effects of population growth on land cover and runoff within the Spring Creek and West Fork of San Jacinto River watersheds. Land cover data from 2001 and 2011 was used to estimate percent developed area, and then the change in land cover between 2001 and 2011 was used to predicted land cover in 2021. The effect of the watershed development on 1% AEP peak flow rates and runoff volume was assessed using HEC-HMS. The report stated that solely using impervious cover increase to evaluate future conditions hydrology provides limited accuracy since it does not account for other drainage improvements that typically occur along with development, such as new storm sewer systems and detention basins.

The main conclusion of the study was that given the large size of these watersheds, even large developments would have a minimal impact on hydrology. Changes in future hydrology were anticipated to be gradual and more characteristic of slow increases in runoff volume rather than rapid increases in peak flow.

2.0 Field Reconnaissance

Field reconnaissance was performed for the entire study area, which encompassed the overall San Jacinto River watershed and included the following major streams: Spring Creek, Willow Creek, Lake Creek, West Fork of San Jacinto River, Caney Creek, Peach Creek, East Fork of San Jacinto River, Jackson Bayou, and Luce/Tarkington Bayou. The purpose of the field reconnaissance effort was to observe and document the condition of existing structures and channels. During the field reconnaissance effort, streams, hydraulic structures (culverts and bridges), outfalls, detention ponds, and other features were visually identified, measured, and photographed for all major streams. Field documentation predominantly occurred at publicly accessible locations, such as crossing of public roads over the streams.

The goal was to obtain as much information as possible that would enhance the existing conditions flood hazard assessment and flood mitigation alternative analysis. Stream crossing structures that had not been previously surveyed or were not planned to be surveyed were prioritized. The data gathered was utilized to update or develop the existing conditions models of the streams and major structures. Field photography of the streams aided in the assessment of Manning's n values and the input of hydraulic structure data.

Data points were classified based on the structure type (culvert, bridge, outfall, inlet, etc.) and included notes describing the structure type, material, culvert sizes and channel conditions. **Exhibit B5** shows the location and classification of the data points collected during the field reconnaissance effort. Typical photographs taken at each structure consisted of upstream and downstream view of the channel, upstream and downstream views of the structures, and any other locations determined to be important to understanding and evaluating the streams. Photographs were linked with a specific GIS data point using the mobile Halff GIS app, which allowed for rapid documentation and organization of the data. **Figure 11** show the view of the channel and view of the structure from a wooden bridge crossing Caney Creek near Millmac Road.

Figure 11. Structure and Channel Example Photographs

In addition to photographs, sketches of the structures were prepared to document the structure opening measurements, the channel location and condition, and any relevant information about the surrounding area. The sketches included either basic culvert data (approximate culvert size, material, and number of barrels) or basic bridge data (deck width and length, number and size of piers, spacing between piers,

height of bridge deck, and the depth of the channel). A sample sketch of a bridge at the FM 149 crossing of Lake Creek is provided below as **Figure 12**.

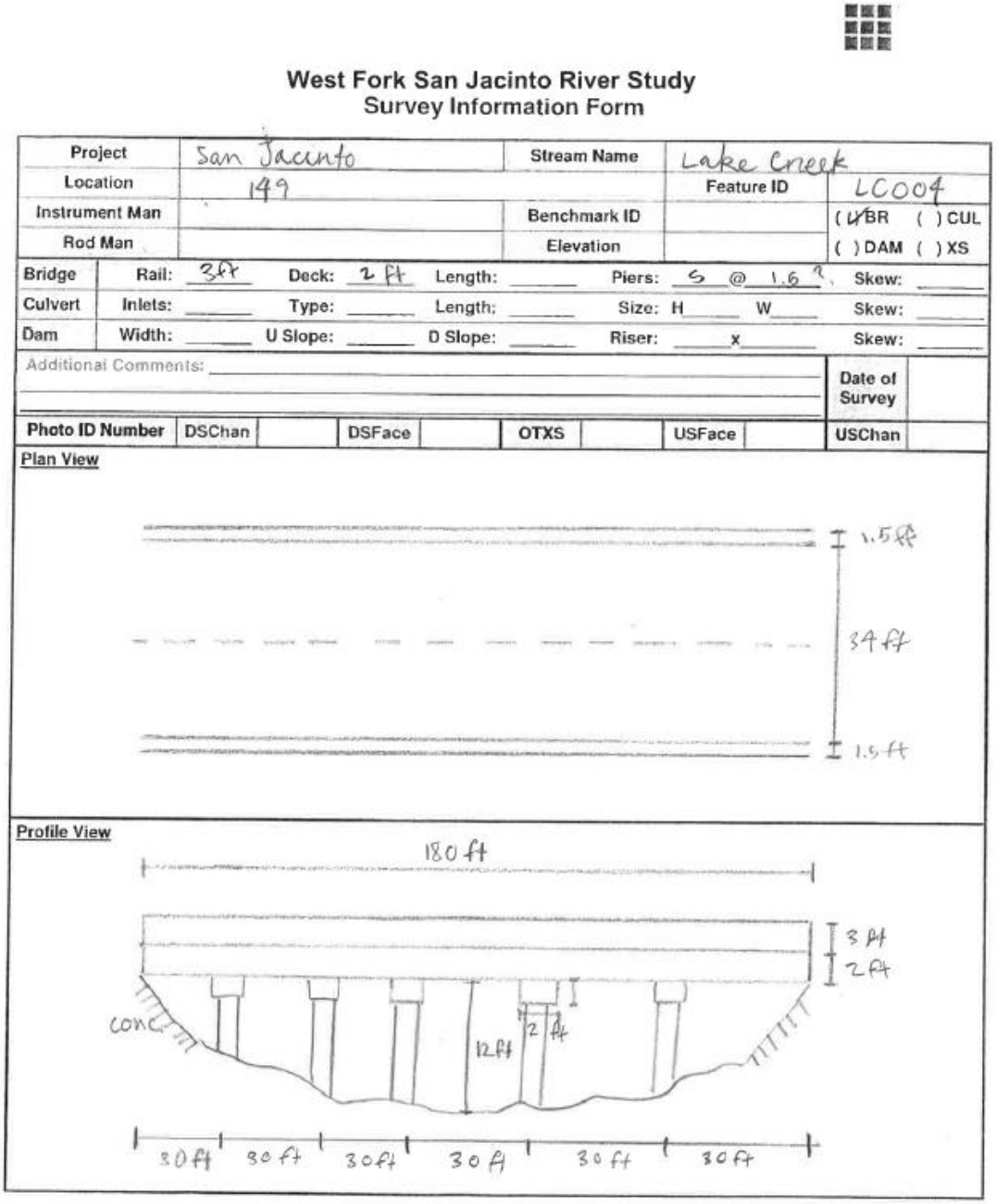


Figure 12. Survey Sketch of Lake Creek Crossing at FM 149

Based on field reconnaissance observations, all of the streams appear to mostly be in a natural state with minimal improvements. **Table 9** includes an approximate number of structures visited during the field reconnaissance and a brief summary of observations general descriptions of the structures in the watershed. Detailed Field Observation Reports (FORs) are included in **Appendix C.**

Table 9. Summary of Field Reconnaissance Observations

Stream / Watershed	Approximate Number of Structures	General Description of Field Reconnaissance Observations
Spring Creek	Site Visit (12 bridges, 6 culverts) Modeled (20 bridges, 4 culverts)	• The channel section north of Hegar Road has medium to high vegetation • The culvert under Murrell Road has some debris • Evidence of stream erosion and sedimentation DS of Kuykendahl Road • Structures at I-10 and SH 99 have high amounts of erosion and sedimentation with medium to high vegetation • Field reconnaissance encompassed a variety of structures: detention ponds, culverts, bridges
Willow Creek	Site Visit (10 bridges, 3 culverts) Modeled (19 bridges, 6 culverts)	• Channel banks had moderate to high vegetation US of the channel and SH 99 intersection • Field reconnaissance encompassed a variety of structures: bridges, detention ponds, outfalls, weirs, and culverts. Majority of the structures were bridges. • Evidence of medium to high erosion and sedimentation DS of SH 249
Lake Creek	Site Visit (8 bridges) Modeled (8 bridges)	• All structures were bridges • Moderate to high bank vegetation throughout the entire channel. Higher vegetation north of FM 149. • Heavy channel debris at FM 149 intersection • Moderate sedimentation and erosion at channel south of FM 149
West Fork of San Jacinto	Site Visit (4 bridges) Modeled (16 bridges)	• All structures were bridges • Moderate to heavy vegetation along channel DS of I-45 • Heavy sedimentation and moderate to heavy erosion US of SH 242
Caney Creek	Site Visit (14 bridges, 1 culvert) Modeled (16 bridges, 1 culvert)	• Most structures were bridges and one culvert at Royal Bridge • Tree and branch debris DS of the structure at the intersection with TX 105 • Medium to high bank vegetation along the channel US of SH 242 • DS of the SH 242 intersection, there is heavy sedimentation and erosion present in the channel
Peach Creek	Site Visit (10 bridges) Modeled (10 bridges, 1 culvert)	• All structures were bridges • Dense brush and grass vegetation on the banks throughout entire channel • Moderate to low sedimentation US of the FM 2920 and I-69 intersection; high sedimentation and light erosion on the channel DS of the intersection
East Fork of San Jacinto	Site Visit (13 bridges) Modeled (14 bridges, 4 culvert)	• Heavy vegetation throughout stream • Sand deposits throughout

Stream / Watershed	Approximate Number of Structures	General Description of Field Reconnaissance Observations
Luce/Tarkington Bayou	Site Visit (14 bridges) Modeled (11 bridges)	• All structures were bridges • Heavy vegetation throughout stream • Debris and sedimentation noticed on downstream end

3.0 Field Survey

3.1 Field Survey Procedures

Field survey data were collected at designated bridge crossings within the San Jacinto River watershed, specifically along Caney Creek, Lake Creek, Luce/Tarkington Bayou, Peach Creek, East Fork San Jacinto River, and West Fork San Jacinto River. These crossings were surveyed to obtain updated information for the channel crossing structures and channel topography for use in hydraulic modeling. Elevation data as well as the dimensions and material were noted for each survey location and photographs were taken to document structure and channel conditions. Survey locations are listed in **Table 10** and shown on **Exhibit B6**.

Table 10. Summary of Structure Survey Locations

River/Creek	Location	Structure Type	Survey ID	LiDAR Scanned
Caney Creek	US Highway 59	Bridge	10015	Y
Caney Creek	State Road 242	Bridge	10021	N
Caney Creek	State Road 105	Bridge	10022	Y
Caney Creek	State Road 150	Bridge	10031	N
Caney Creek	State Road 494	Bridge	10037.1	N
Caney Creek	Railroad	Bridge	10037.2	N
Caney Creek	FM 1485	Bridge	10038	Y
Lake Creek	State Road 105	Bridge	10033	Y
Lake Creek	Sendera Ranch Drive	Bridge	10034	N
Luce Bayou	State Road 321	Bridge	10017	N
Peach Creek	US Highway 59	Bridge	10018.1	Y
Peach Creek	Railroad	Bridge	10018.2	N
Peach Creek	State Road 105	Bridge	10030	N
Peach Creek	FM 1485	Bridge	10039	Y
Peach Creek	Roman Forest Blvd	Bridge	10041	N
SJR-East Fork	US Highway 59 (north bound)	Bridge	10023.1	Y
SJR-East Fork	US Highway 59 (south bound)	Bridge	10023.2	Y
SJR-East Fork	State Road 105	Bridge	10024	Y
SJR-East Fork	State Road 105 (Business)	Bridge	10025	Y
SJR-East Fork	State Road 150	Bridge	10029	N
SJR-East Fork	FM 1485	Bridge	10040	Y
SJR-West Fork	State Highway 99	Bridge	10016	Y
SJR-West Fork	State Road 242	Bridge	10019	N
SJR-West Fork	Interstate 45	Bridge	10035	N
Tarkington Bayou	State Road 105	Bridge	10026	Y
Tarkington Bayou	State Road 787	Bridge	10027	Y
Tarkington Bayou	US Highway 59	Bridge	10028	Y

Field survey data were collected using a Leica GS-14 GPS Receiver, a Leica TS-12 Robotic Total Station, and a LiDARUSA HD Mobile Mapper. Horizontal and vertical control was established at each location consisting of two 5/8" rebar and cap stamped "Halff Control Point" for GPS check-in and Total Station set-ups, and multiple reflective ground targets for LiDAR scan registration. Horizontal and vertical solutions for GPS data and control points were derived from multiple Real-Time Kinematic (RTK) Global Positioning System (GPS) observations (180 epochs each) delivered through the TxDOT Real Time Network (RTN). Data from the LiDARUSA HD Mobile Mapper was acquired at posted speeds with trajectories generated by utilizing Inertial Explorer and Scanlook HD which were then applied to the acquired LiDAR data. Relevant assets were extracted from the LiDAR data and included as survey points in the project CAD file.

The horizontal position of all the survey data was referenced to the Texas State Plane Coordinate System, Central Zone (4203), North American Datum: NAD 83(2011) Epoch 2010.00. Data positions are Grid Values in U.S. Survey Feet. Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

3.2 Survey Field Reconnaissance

Field crews surveyed the 27 bridge structures listed in **Table 10** above during the from April through August 2019. Some of the structures surveyed were single 2-lane bridges while others consisted of multi-lane bridges and adjacent frontage road bridges. Two of the structures were railroad bridges. At each bridge, field measurements of structural components and stream cross sectional data were obtained. Photographs were taken and plan and profile view sketches were prepared for each structure. Sketches and dimensional information were prepared on FEMA survey record forms.

TERRAIN MAP

HARRIS COUNTY FLOOD CONTROL DISTRICT

San Jacinto Regional Watershed Master Drainage Plan

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN

Exhibit B1

PROJECT AVO 33465

DATUM & COORDINATE SYSTEM

NAD 1983 2011 StatePlane Texas South Central FIPS 4204 FtUS

N W E S

Legend

- Watershed Limit

Elevation (2018 LiDAR)

- -40 - 40
- 40 - 120
- 120 - 200
- 200 - 280
- 280 - 360
- 360 - 440
- 440 - 507

0 36,000 72,000 Feet

1 inch = 36,000 feet

West Fork of SJR

East Fork

Lake Creek

Peach Creek

Caney Creek

Spring Creek

Willow Creek

Little Cypress Creek

Cypress Creek

Luce Bayou

Jackson Bayou

East Fork San Jacinto

Tarkington Bayou

West Fork of San Jacinto Main Stem

Walker

Polk

Tyler

Grimes

Brazos

Burleson

Washington

Montgomery

Harris

San Jacinto

Liberty

Hardin

Chambers

Waller

PROJECT AVO 33465

DATUM & COORDINATE SYSTEM
NAD 1983 2011 StatePlane Texas South Central FIPS 4204 FtUS

HARRIS COUNTY FLOOD CONTROL DISTRICT
San Jacinto Regional Watershed Master Drainage Plan

GAGES MAP

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN

Exhibit B2

Legend

- USGS Rainfall Gage
- HCFCD Rainfall Gage
- SJRA Gage
- Watershed Limit

0 36,000 72,000 Feet

1 inch = 36,000 feet

Lake Creek
West Fork of SJR
East Fork
Peach Creek
Caney Creek
Spring Creek
Willow Creek
Little Cypress Creek
Cypress Creek
Jackson Bayou
Luce Bayou
Tarkington Bayou
Lake Conroe
Lake Houston

STATION: 08067548
STATION: 08067650
STATION: 08067920
STATION: 08068400
STATION: 08068000
STATION: 08068390
STATION: 08068500
STATION: 08068090
STATION: 08070500
STATION: 08071000
STATION: 08070000
STATION: 08070200
STATION: 08071280
STATION: 08069500
STATION: 08069000
STATION: 08068900
STATION: 08068325
STATION: 08068450
STATION: 08068275
STATION: 08068780
STATION: 08068800
STATION: 08068740
STATION: 08068700
STATION: 08068720
STATION: 08072050

Walker
Montgomery
Grimes
Brazos
Washington
Waller
Harris
San Jacinto
Polk
Tyler
Liberty
Hardin
Chambers
Jackson
Burleson

USGS HIGH WATER MARKS MAP

HARRIS COUNTY FLOOD CONTROL DISTRICT
San Jacinto Regional Watershed Master Drainage Plan

PROJECT AVO 33465

DATUM & COORDINATE SYSTEM
NAD 1983 2011 StatePlane Texas South Central FIPS 4204 FIUS

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN

Exhibit B3

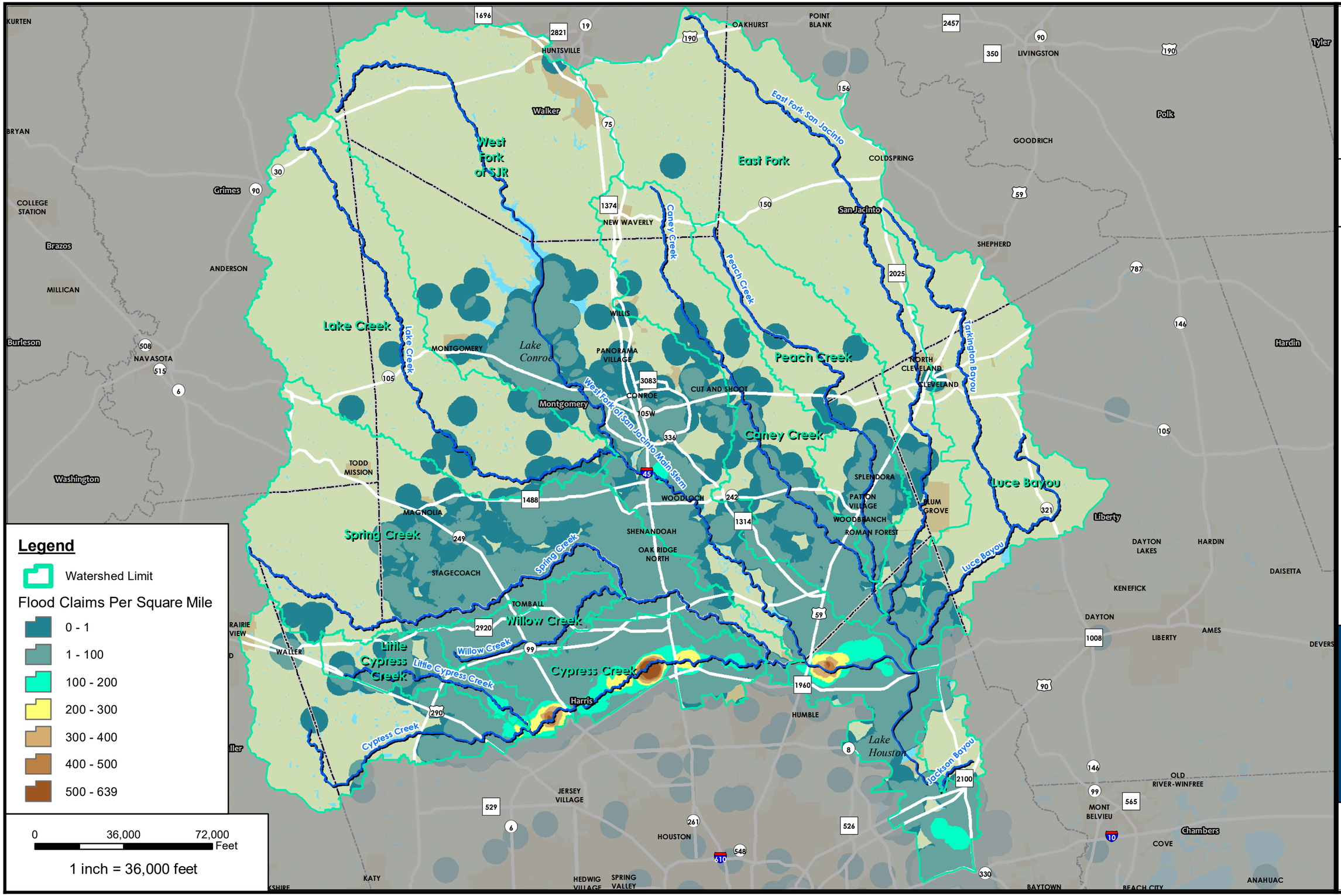
Legend

- USGS High Water Mark
- Watershed Limit

0 36,000 72,000 Feet

1 inch = 36,000 feet

West Fork of SJR
East Fork
East Fork San Jacinto
Lake Creek
Peach Creek
Caney Creek
Spring Creek
Willow Creek
Little Cypress Creek
Cypress Creek
Luce Bayou
Tarkington Bayou
Jackson Bayou
West Fork of San Jacinto Main Stem
Lake Conroe
Lake Houston



PROJECT AVO 33465

DATUM & COORDINATE SYSTEM

NAD 1983 2011 StatePlane Texas South Central FIPS 4204 FIUS

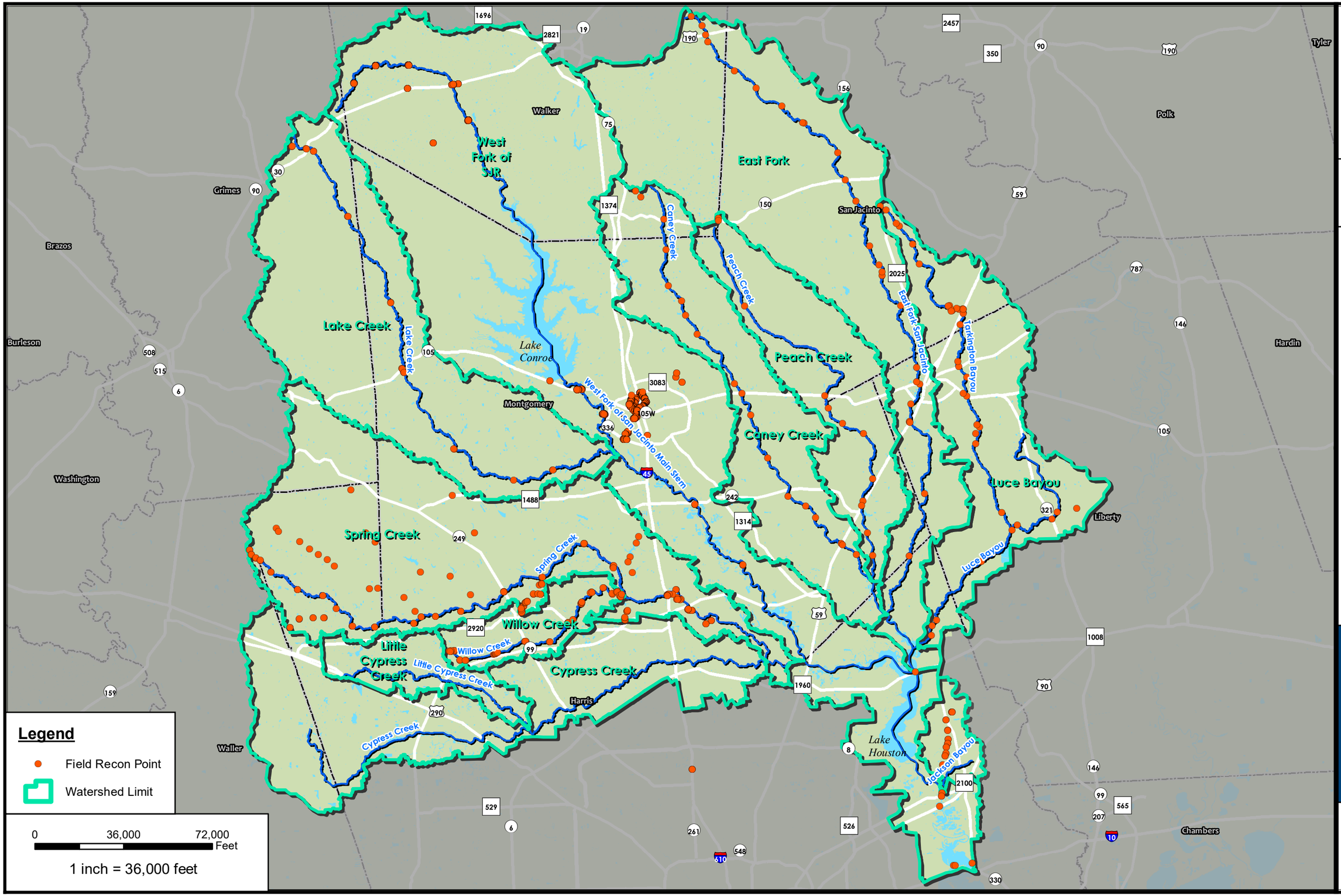
HARRIS COUNTY FLOOD CONTROL DISTRICT

San Jacinto Regional Watershed Master Drainage Plan

FEMA FLOOD CLAIMS MAP

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN

Exhibit B4



PROJECT AVO 33465

DATUM & COORDINATE SYSTEM
NAD 1983 2011 StatePlane Texas South Central FIPS 4204 FIUS

HARRIS COUNTY FLOOD CONTROL DISTRICT
San Jacinto Regional Watershed Master Drainage Plan

FIELD RECONNAISSANCE MAP

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN

Exhibit B5

SURVEY LOCATION MAP

HARRIS COUNTY FLOOD CONTROL DISTRICT

San Jacinto Regional Watershed Master Drainage Plan

SAN JACINTO REGIONAL WATERSHED MASTER DRAINAGE PLAN

Exhibit B6

PROJECT AVO 33465

DATUM & COORDINATE SYSTEM

NAD 1983 2011 StatePlane Texas South Central FIPS 4204 FIUS

N W E S

Legend

- Survey Location
- Watershed Limit

0 36,000 72,000 Feet

1 inch = 36,000 feet

Lake Creek
Lake Creek
Lake Conroe
West Fork of SJR
Walker
Montgomery
West Fork of San Jacinto Main Stem
East Fork
San Jacinto
Caney Creek
Peach Creek
East Fork San Jacinto
Tarkington Bayou
Peach Creek
Caney Creek
Luce Bayou
Liberty
Polk
Tyler
Hardin
Chambers
Spring Creek
Spring Creek
Willow Creek
Willow Creek
Little Cypress Creek
Little Cypress Creek
Cypress Creek
Cypress Creek
Harris
Waller
Washington
Grimes
Brazos
Burleson
Lake Houston
Jackson Bayou
Luce Bayou

Appendix B.1

Field Observation Reports

14800 Saint Mary's Ln.; Suite 160
Houston, TX 77079
(713) 588-2450

FIELD OBSERVATION REPORT

Project: San Jacinto River Watershed Master Drainage Plan Study **Report number: 1**

Client: Harris County Flood Control District Date: 04/29/2019

Subject: Field Reconnaissance – S_100 AVO:

WEATHER			SITE CONDITIONS		DAY	
☒ Clear	☐ Snow	☒ Warm	☒ Clear	☐ Dusty	☒ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy		☐ Tuesday	☐ Friday
☐ Rain	☐ Cold	Temperature: 85-degrees			☐ Wednesday	

OBSERVATIONS:

As part of the San Jacinto River Watershed Master Drainage Plan Study, a field reconnaissance effort was conducted for S_100 (Luce Bayou). The effort consisted of locating, photographing, and recording the crossing type of various crossings along Luce Bayou. The photographs and field notes taken are presented in this report.

Luce Bayou is located on the east side of the San Jacinto watershed and discharges into the East Fork San Jacinto River just upstream of Lake Houston. The channel starts upstream of Texas State Highway 321 in Liberty County and discharges into the East Fork San Jacinto River. Access was mostly limited to road crossings.

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Stream: S_100		**Field Grid:** L-1	**HMS Subbasin:**
OBJECTID: 244	Upstream face of Huffman Cleveland Rd. bridge.	OBJECTID: 390	Downstream face of Huffman Cleveland Rd. bridge.

OBJECTID: 242	Luce Bayou looking upstream of Huffman Cleveland Rd. bridge.	OBJECTID: 237	Luce Bayou looking downstream of Huffman Cleveland Rd. bridge.

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Stream: S_100		**Field Grid:** L-2	**HMS Subbasin:**
OBJECTID: 255	Upstream face of Crosby Huffman Rd. bridge.	OBJECTID: 261	Downstream face of Crosby Huffman Rd. bridge.
			
OBJECTID: 253	Luce Bayou upstream of Crosby Huffman Rd. bridge.	OBJECTID: 256	Luce Bayou downstream of Crosby Huffman Rd. bridge.
			

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Stream: S_100		**Field Grid:** L-3	**HMS Subbasin:**
OBJECTID: 270	Upstream face of Doverbrook Dr. bridge.	OBJECTID: 271	Downstream face of Doverbrook Dr. bridge.

OBJECTID: 271	Luce Bayou upstream of Doverbrook Dr. bridge.	OBJECTID: 469	Luce Bayou downstream of Doverbrook Dr. bridge.

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Stream: S_100		**Field Grid:** L-7	**HMS Subbasin:**
OBJECTID: 283	Upstream face of FM 321 bridge.	OBJECTID: 279	Downstream face of FM 321 bridge.

OBJECTID: 288	Channel upstream of FM 321 bridge.	OBJECTID: 285	Channel downstream of FM 321 bridge.

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Stream: S_100		**Field Grid:** L-9	**HMS Subbasin:**
OBJECTID: 304	Upstream face of FM 1008 bridge.	OBJECTID: 295	Downstream face of FM 1008 bridge.

OBJECTID: 305	Channel upstream of FM 1008 bridge.	OBJECTID: 294	Channel downstream of FM 1008 bridge.

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Houston, TX 77079
(713) 588-2450

FIELD OBSERVATION REPORT

Project: San Jacinto Regional Watershed Master Drainage Plan

Report number: 1

Client: Harris County Flood Control District

Date: 4/18/2019- 4/19/2019, 4/24/2019

Subject: Field Reconnaissance – Peach Creek (GPC)

AVO: **33465**

WEATHER

- ☒ Clear
- ☐ Overcast
- ☐ Rain
- ☐ Snow
- ☐ Foggy
- ☐ Cold
- ☒ Warm
- ☐ Hot

SITE CONDITIONS

- ☒ Clear
- ☐ Muddy
- ☐ Dusty

Temperature: 70-degrees

DAY

- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☒ Thursday
- ☐ Friday

OBSERVATIONS:

As part of the San Jacinto River Study project, a field reconnaissance effort was conducted for GPC, Peach Creek. The primary objective of the field visit is to document the crossing structures of Peach Creek. Photographs obtained from the field visit are presented in this report. A map showing their locations is included at the end of the document.

Peach Creek is in the northwestern portion of Harris County, and is a grass-lined natural channel. Access was usually limited to those areas immediately around the structures.

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Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127830_a	Upstream view of culvert at Jim Browder Road.	OBJECTID: 127830_b	Downstream view of culvert at Jim Browder Road.

OBJECTID: 127830_c	Upstream view of Peach Creek at Jim Browder Road.	OBJECTID: 127830_d	3.0 feet of erosion on the downstream side of the culvert at Jim Browder Road.

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Houston, TX 77079
(713) 588-2450

Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127835_a	Downstream view drainage flume at Jones Road. The recon team could not access the structure.	OBJECTID: 127835_b	Downstream view of Peach Creek at SH 150. Limited view due to lack of access.

OBJECTID: 128233_a	Upstream face of the bridge at FM 3081 Road.	OBJECTID: 128233_b	Upstream view of Peach Creek from the bridge at FM 3081 Road.

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(713) 588-2450

Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128233_c	Downstream face of the bridge at FM 3081 Road.	OBJECTID: 128233_d	Downstream view of Peach Creek from the bridge at FM 3081 Road.

OBJECTID: 128234_a	Upstream face of the bridge at TX-105.	OBJECTID: 128234_b	Upstream view of Peach Creek from the bridge at TX-105.

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Houston, TX 77079
(713) 588-2450

Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128234_c	Downstream view of Peach Creek from the bridge at TX-105.	OBJECTID: 128234_d	Downstream face of the bridge at TX-105.

OBJECTID: 131315_a	Upstream view of the face of the bridge at Old TX-105 crossing.	OBJECTID: 131315_b	Upstream view of Peach Creek from bridge at Old Tx-105.

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Houston, TX 77079
(713) 588-2450

Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
131315_c	Downstream view of the face of the bridge at Old TX-105 crossing.

OBJECTID:	
131315_d	Downstream view of Peach Creek and the railroad bridge at Old Tx-105.

OBJECTID:	
132214_a	Upstream view of bridge at Faulkner Road crossing.

OBJECTID:	
132214_b	Upstream view from the bridge at Faulkner Road crossing.

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Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 132214_c	Downstream view from the bridge at Faulkner Road crossing.

OBJECTID: 131816_d	Upstream view of the face of the bridge at Morgan Cemetery Road.

OBJECTID: 131816_b	Upstream view of Peach Creek at Morgan Cemetery Road.

OBJECTID: 131816_c	Downstream view of the face of the bridge at Morgan Cemetery Road.

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Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131816_d	Downstream view of Peach Creek at Morgan Cemetery Road.	OBJECTID: 132613_a	Face of bridge on upstream side of FM 2090.

OBJECTID: 132613_b	Downstream view of Peach Creek at FM 2090.	OBJECTID: 132613_c	Face of bridge on downstream side of FM 2090.

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Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 132613_	Downstream view of Caney Creek.	OBJECTID: 132614_a	Face of bridge on upstream side of Creekwood Drive. Sandy overbanks. Light vegetation.

OBJECTID: 132614_b	Upstream view of Caney Creek from the bridge of Creekwood Drive.	OBJECTID: 132614_c	Downstream view of Caney Creek. Moderate vegetation.

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Houston, TX 77079
(713) 588-2450

Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 132215_a	Downstream face of the bridge at Roman Forest Blvd.

OBJECTID: 132215_b	Downstream face of the bridge at Roman Forest Blvd.

OBJECTID: 132215_c	Downstream view of Peach Creek from the bridge at Roman Forest Blvd.

OBJECTID: 132617_a	Upstream face of the bridge at FM 1485.

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Stream: Peach Creek (GPC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 132617_b	Upstream view of Peach Creek from the bridge at FM 1485.	OBJECTID: 132617_c	Downstream face of the bridge at FM 1485.

OBJECTID: 132617_d	Downstream view of Peach Creek from the bridge at FM 1485.	OBJECTID:	

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Houston, TX 77079
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FIELD OBSERVATION REPORT

Project: San Jacinto Regional Watershed Master Drainage Plan

Report number: 1

Client: Harris County Flood Control District

Date: 4/18/2019- 4/19/2019, 4/23/2019

Subject: Field Reconnaissance – Caney Creek (GCC)

AVO: **33465**

WEATHER

- ☒ Clear
- ☐ Overcast
- ☐ Rain
- ☐ Snow
- ☐ Foggy
- ☐ Cold
- ☒ Warm
- ☐ Hot

SITE CONDITIONS

- ☒ Clear
- ☐ Muddy
- ☐ Dusty

Temperature: 70-degrees

DAY

- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☒ Thursday
- ☐ Friday

OBSERVATIONS:

As part of the San Jacinto River Study project, a field reconnaissance effort was conducted for GCC, Caney Creek. The primary objective of the field visit is to document the crossing structures of Caney Creek. Photographs obtained from the field visit are presented in this report. A map showing their locations is included at the end of the document.

Caney Creek is in the northwestern portion of Harris County, and is a grass-lined natural channel. Access was usually limited to those areas immediately around the structures.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127825_a	Upstream view of culverts at FM 1375.	OBJECTID: 127825_b	Downstream view of culvert at FM 1375.

OBJECTID: 127825_c	Erosion to the east of the culvert on the upstream side at FM 1375.	OBJECTID: 127825_d	Erosion to the west of the culvert on the upstream side at FM 1375.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127827_a	Upstream view of dual culverts at Jones Road.

OBJECTID: 127827_b	View of upstream of culverts with a flap gate at crossing of Jones Road.

OBJECTID: 127827_c	Downstream view of culverts at Jones Road.

OBJECTID: 127828_a	Upstream view of bridge at crossing of TX-150.

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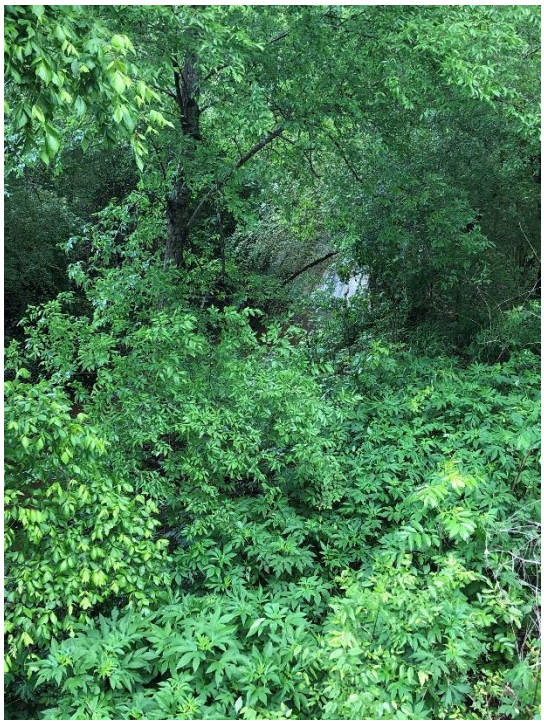
Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127828_b	Upstream view of channel at crossing of TX-150.	OBJECTID: 127828_c	Downstream view of bridge at crossing of TX-150.



OBJECTID: 127828_d	Downstream view of channel at crossing of TX-150.	OBJECTID: 127837_a	Upstream view of bridge at Bilnoski Rd.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127837_b	View of Caney Creak upstream from Bilnoski Rd.	OBJECTID: 127837_c	View of Caney Creek downstream of Bilnoski Rd.

OBJECTID: 127837_d	View of bridge from downstream at Bilnoski Rd.	OBJECTID: 127843_a	Upstream view of bridge at FM 1097 crossing.

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Houston, TX 77079
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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127843_b	Upstream view from bridge at FM 1097 crossing.	OBJECTID: 127843_c	Downstream view of bridge at FM 1097 crossing.

OBJECTID: 128213_a	Upstream view of bridge at County Line Road crossing.	OBJECTID: 128213_b	Upstream view from the bridge at County Line Road crossing.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128213_c	Downstream view from the bridge at County Line Road crossing.	OBJECTID: 128213_d	Downstream view of bridge at County Line Road crossing.

OBJECTID: 128218_a	Upstream view of culvert intake at Royal Bridge Court.	OBJECTID: 128218_b	View of upstream from the culvert at Royal Bridge Court.

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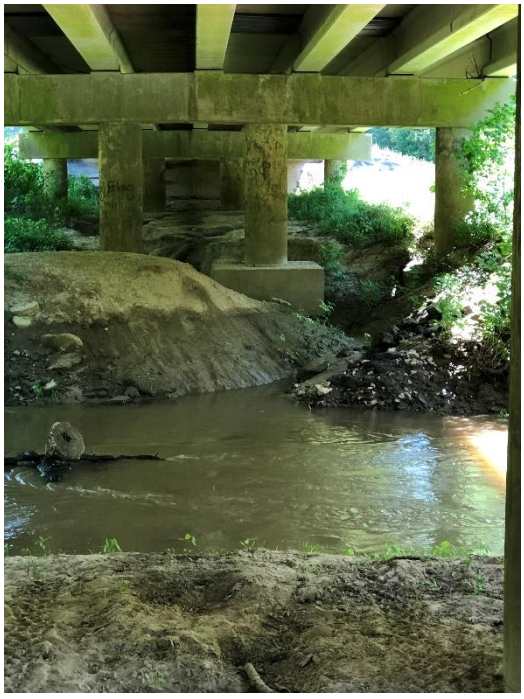
Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128218_c	Downstream view of culvert at Royal Bridge Court.	OBJECTID: 128218_d	Downstream view of Caney Creek at Royal Bridge Court.

OBJECTID: 128221_a	Face of bridge on upstream side of FM 1484.	OBJECTID: 128221_b	View of channel below bridge on FM 1484. Erosion around piers.



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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128221_c	Downstream view of Caney Creek.	OBJECTID: 128221_d	Face of bridge on downstream side of FM 1484. Moderate vegetation.

OBJECTID: 128226_a	Face of wooden bridge on upstream side of Millmac Road.	OBJECTID: 128226_b	Upstream view of Caney Creek. Moderate vegetation.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128226_c	Face of bridge on downstream side of Millmac Road.	OBJECTID: 128226_d	Downstream view of Caney Creek from the wooden bridge on Millmac Road.

OBJECTID: 128227_a	Right overbank face of the bridge over SH 105.	OBJECTID: 128227_b	Downstream view of Caney Creek from the bridge at SH 105.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128227_c	Upstream face of the bridge at SH 105.	OBJECTID: 128227_d	Upstream view of Caney Creek at SH 105.

OBJECTID: 128227_e	Left overbank view of bridge at SH 105. Moderate vegetation.	OBJECTID: 131013_a	Face of railroad bridge near Crockett Martin Road.

HALFF®

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131013_b	Upstream view of Caney Creek at the railroad.	OBJECTID: 131013_c	Downstream view of Caney Creek at the railroad near Crockett Martin Road.

OBJECTID: 131015_a	Upstream view of bridge at FM 2090 crossing.	OBJECTID: 131015_b	Downstream view of Caney Creek from FM 2090 bridge.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131015_c	Face of bridge on downstream side of FM 2090.	OBJECTID: 131022_a	Face of bridge on upstream side of TX-242.

OBJECTID: 131022_b	View of erosion on downstream side of the bridge crossing at TX-242.	OBJECTID: 131022_c	Face of bridge on downstream side of TX-242.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131027_a	Upstream view of bridge at County Line Road crossing.	OBJECTID: 131027_b	Face of bridge on downstream side of Firetower Road crossing.

OBJECTID: 131027_c	Upstream view of Caney Creek at the Firetower Road crossing.	OBJECTID: 131027_d	Downstream view of Caney Creek at the Firetower Road crossing.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131039_a	Upstream view of bridge at Sycamore Lane crossing.	OBJECTID: 131039_b	Face of bridge on downstream side Sycamore Lane crossing.

OBJECTID: 131039_c	Upstream view of Caney Creek at the Sycamore Lane crossing.	OBJECTID: 131039_d	Downstream view of Caney Creek at the Sycamore Lane crossing.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131415_a	View from under bridge at US-59. There are three bridges. Two for the frontage roads and one for the main highway.	OBJECTID: 131415_b	Upstream view of Caney Creek at the HW-59 crossing.

OBJECTID: 131415_c	Downstream view of Caney Creek at the US-59 crossing.	OBJECTID: 131415_d	View of erosion under the middle bridge crossing at US-59.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131416_a	Upstream view of bridge at County Line Road crossing.	OBJECTID: 131416_b	View of the bridge under TX-494. Moderate vegetation.

OBJECTID: 131416_c	Downstream view of the face of the bridge crossing at TX-494.	OBJECTID: 131416_d	Additional downstream view of the face of the bridge crossing at TX-494. View of main channel.

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Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131416_e	Upstream view of Caney Creek from the bridge crossing at TX-494.

OBJECTID: 131416_f	Downstream view of railroad bridge TX-494 crossing. This is an additional bridge crossing approximately 100 feet downstream of TX-494.

OBJECTID: 131421_a	Upstream view of the face of the bridge at FM 1485 crossing.

OBJECTID: 131421_b	Downstream view of the face of the bridge at FM 1485 crossing.

Stream: Caney Creek (GCC)	**Field Grid: N/A**	**HMS Subbasin:**

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Houston, TX 77079
(713) 588-2450

OBJECTID: 131421_c	Upstream view of Caney Creek from the bridge crossing at FM 1485.	OBJECTID: 131421_d	Downstream view of Caney Creek from the bridge crossing at FM 1485.
			
OBJECTID:		OBJECTID:	

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Houston, TX 77079
(713) 588-2450

FIELD OBSERVATION REPORT

Project: San Jacinto River Watershed Master Drainage Plan Study **Report number: 1**

Client: Harris County Flood Control District Date: 04/29/2019

Subject: Field Reconnaissance – GEF_100 AVO:

WEATHER

- ☒ Clear
- ☐ Overcast
- ☐ Rain
- ☐ Snow
- ☐ Foggy
- ☐ Cold
- ☒ Warm
- ☐ Hot

SITE CONDITIONS

- ☒ Clear
- ☐ Muddy
- ☐ Dusty

Temperature: 85-degrees

DAY

- ☒ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☐ Thursday
- ☐ Friday

OBSERVATIONS:

As part of the San Jacinto River Watershed Master Drainage Plan Study, a field reconnaissance effort was conducted for GEF_100 (East Fork San Jacinto River). The effort consisted of locating, photographing and recording the crossing type of various crossings along the East Fork of the San Jacinto River. The photographs and field notes taken are presented in this report.

GEF_100 is located on the east side of the San Jacinto watershed and discharges into the San Jacinto River at the downstream end of the watershed. The channel starts at Stanley Road just east of FM 405 and discharges into the San Jacinto River. Access was mostly limited to road crossings.

FN PROJECT NO. OFF19050
DATE CREATED Date: 7/8/2019
DATUM & COORDINATE SYSTEM NAD83 State Plane (feet) Texas Central
FILE NAME Name Crossings detailed - PK
PREPARED BY JGJ

Harris County Flood Control District
Upper San Jacinto River Regional Watershed Flood Mitigation Plan

Field Work – East Fork/Luce/Tarkington Crossings

FREESE AND NICHOLS, INC.
10497 TOWN AND COUNTRY WAY SUITE 600
HOUSTON, TEXAS 77024
PHONE: 713-600-6800

FIGURE

-

PN PROJECT NO. OFF19050
DATE CREATED Date: 7/8/2019
DATUM & COORDINATE SYSTEM NAD83 State Plane (feet) Texas Central
FILE NAME Name Crossings detailed - PK
PREPARED BY JGJ

Harris County Flood Control District
Upper San Jacinto River Regional Watershed Flood Mitigation Plan

Field Work – East Fork/Luce/Tarkington Crossings

FREESE AND NICHOLS, INC.
10497 TOWN AND COUNTRY WAY SUITE 600
HOUSTON, TEXAS 77024
PHONE: 713-600-6800

FIGURE

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Date Saved: 7/8/2019 3:32:40 PM

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PN PROJECT NO. OFF19050
DATE CREATED Date: 7/8/2019
DATUM & COORDINATE SYSTEM NAD83 State Plane (feet) Texas Central
FILE NAME Name Crossings detailed - PK
PREPARED BY JGJ

Field Work – East Fork/Luce/Tarkington Crossings

Harris County Flood Control District
Upper San Jacinto River Regional Watershed Flood Mitigation Plan

FREESE AND NICHOLS, INC.
10497 TOWN AND COUNTRY WAY SUITE 600
HOUSTON, TEXAS 77024
PHONE: 713-600-6800

FIGURE

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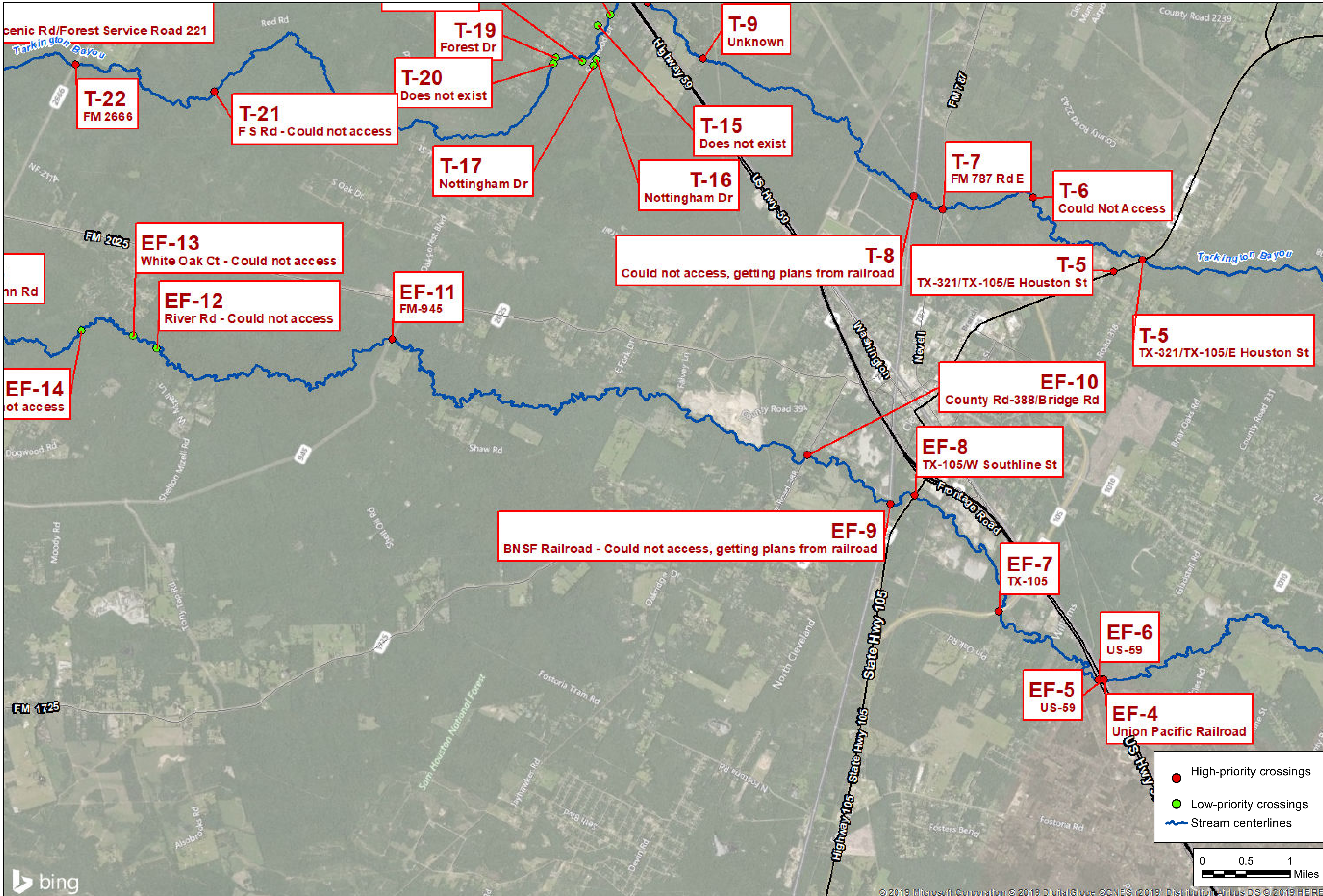

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FIGURE

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Stream: GEF_100		**Field Grid:** EF-1	**HMS Subbasin:**
OBJECTID: 40	Upstream of the crossing at FM 1960.	OBJECTID: 47	Downstream of the crossing at FM 1960
			
OBJECTID: 42	Bank protection on the north side of FM 1960	OBJECTID: 49	Bank protection on the south side of FM 1960
			

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Stream: GEF_100		**Field Grid:** EF-2	**HMS Subbasin:**
OBJECTID: 5	Upstream face of bridge crossing at FM 1485.	OBJECTID: 9	Downstream face of bridge crossing at FM 1485.

OBJECTID: 6	Channel looking upstream of FM 1485.	OBJECTID: 8	Channel looking downstream of FM 1485.

Bridge Data Sheet

Crossing No. EF-2

Road: FM-V485 Date: _____

River: _____ Job No.: _____

Bridge Info

Piers No. of Piers: 6 Pier Dia.: 16" Pier Spacing: 40' O.C.

Piers type Circular ☐ Elliptical ☐ Other ☒ square

Other Description: _____

Bridge Width (as the stream flows): _____ Bridge Length: _____

Deck Thickness 66" Abutments SS: 2 : 1

Bridge Clearance (from low chord to stream invert): _____

Additional Info: concrete barrier - 33"

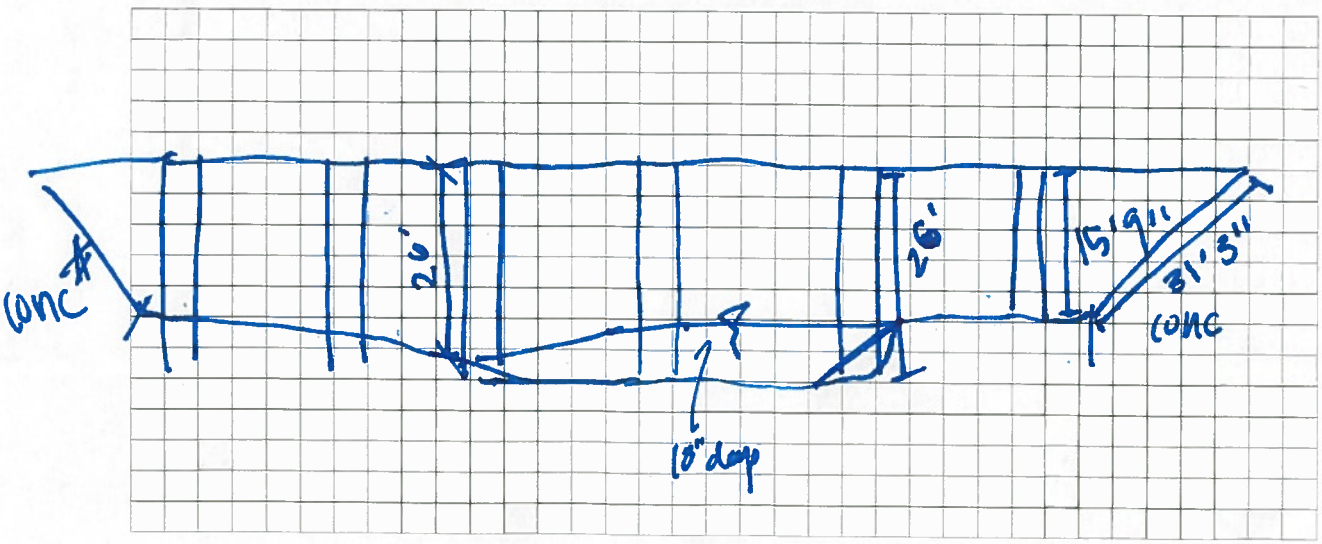
Stream Info

LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☐ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: _____



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Stream: GEF_100		**Field Grid:** EF-3	**HMS Subbasin:**
OBJECTID: 17	Upstream face of FM 2090 bridge.	OBJECTID: 13	Downstream face of FM 2090 bridge.

OBJECTID: 37	Facing upstream end of bridge at FM 2090.	OBJECTID: 35	Water northeast of the channel crossing.

Bridge Data Sheet

Crossing No.: EF-3

Road: FM 2090 Date: _____

River: _____ Job No.: _____

Bridge Info

Piers No. of Piers: 19 Pier Dia.: 16" Pier Spacing: 40'4" O.C.

Piers type Circular ☐ Elliptical ☐ Other ☒ square

Other Description: _____

Bridge Width (as the stream flows): _____ Bridge Length: _____

Deck Thickness 5.1' Abutments SS: 2 : 1

Bridge Clearance (from low chord to stream invert): _____

Additional Info: 26" concrete barrier

_____

Stream Info

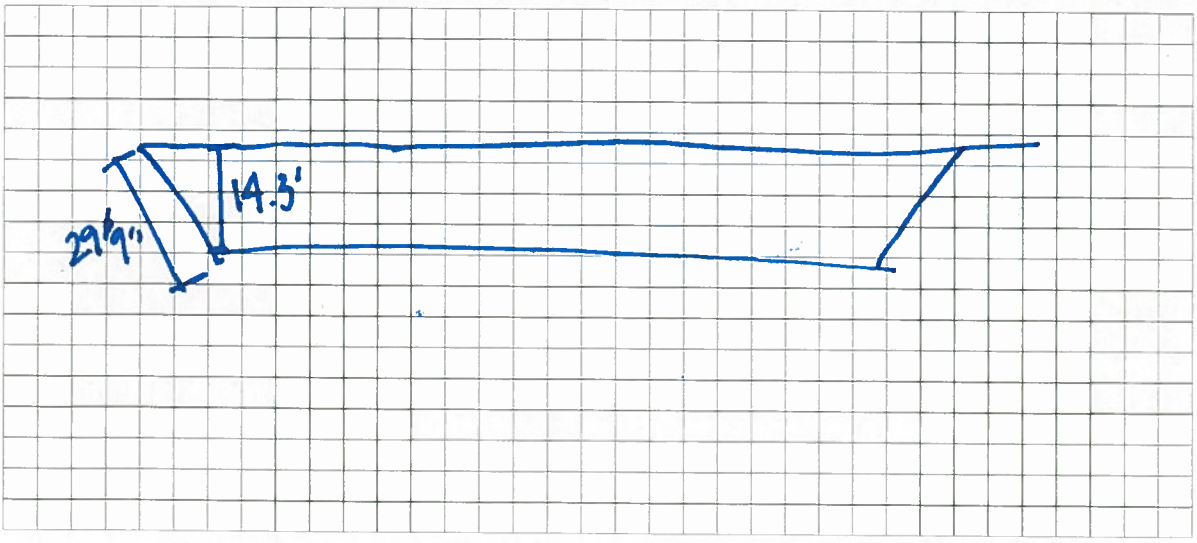
LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☐ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: _____

_____



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Stream: GEF_100		**Field Grid:** EF-4	**HMS Subbasin:**
OBJECTID: 81	Upstream face of railroad at US 59.	OBJECTID: 85	Downstream face of railroad crossing at US 59.
			
OBJECTID: 83	Facing upstream channel and crossings EF-5 and EF-6.	OBJECTID: 80	Facing railroad crossing from upstream end.
			

Bridge Data Sheet

Crossing No.: _____

Road: US-89 Date: _____

River: East Fork EF-4 Job No.: _____

Bridge Info

Piers No. of Piers: _____ Pier Dia.: 14" Pier Spacing: _____

Piers type Circular [X] Elliptical [ ] Other [ ]

Other Description: Timber piers (Railroad crossing)

Bridge Width (as the stream flows): _____ Bridge Length: _____

Deck Thickness _____ Abutments SS: _____ : 1

Bridge Clearance (from low chord to stream invert): _____

Additional Info: Runs parallel to EF-6 & EF-5 → can assume same bridge length.

Stream Info

LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural [X] Concrete [ ] Other [ ] Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: _____ : 1

Channel Depth: _____ Additional Info: left over bank overgrown / wooded. lots of sand deposits on right bank.

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Stream: GEF_100		**Field Grid:** EF-5	**HMS Subbasin:**
OBJECTID: 90	Upstream bridge face at US 59.	OBJECTID: 91	Downstream bridge face at US 59.
			
OBJECTID: 83	Channel at US 59 from downstream end facing the bridge crossing.	OBJECTID: 89	Upstream face of bridge with abutment.
			

Bridge Data Sheet

Crossing No.: _____

Road: US-59 Date: _____

River: East Fork EF-5 Job No.: _____

Bridge Info

Piers No. of Piers: _____ Pier Dia.: _____ Pier Spacing: _____

Piers type Circular ☐ Elliptical ☐ Other ☒

Other Description: square

Bridge Width (as the stream flows): _____ Bridge Length: _____

Deck Thickness _____ Abutments SS: _____ : 1

Bridge Clearance (from low chord to stream invert): _____

Additional Info: Will Request Survey / TXDOT Asbuilts.

Stream Info

LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☒ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: _____ : 1

Channel Depth: _____ Additional Info: Pretty even, overbank pretty flat w/ few shrubs.

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Stream: GEF_100	**Field Grid:** EF-6	**HMS Subbasin:** Q100E, Q100F1

OBJECTID: 94	Channel upstream US 59.	OBJECTID: 96	Downstream face of bridge at US 59.

OBJECTID:	Upstream face of the bridge at US 59.	OBJECTID: 83	Main channel through EF-6 and EF-5.

Bridge Data Sheet

Crossing No.: _____

Road: US-59 Date: _____

River: East Fork EF-6 Job No.: _____

Bridge Info

Piers No. of Piers: _____ Pier Dia.: _____ Pier Spacing: _____

Piers type Circular ☑ Elliptical ☐ Other ☐

Other Description: _____

Bridge Width (as the stream flows): _____ Bridge Length: _____

Deck Thickness _____ Abutments SS: ____ : 1

Bridge Clearance (from low chord to stream invert): _____

Additional Info: Request survey & TxDOT As-builts.

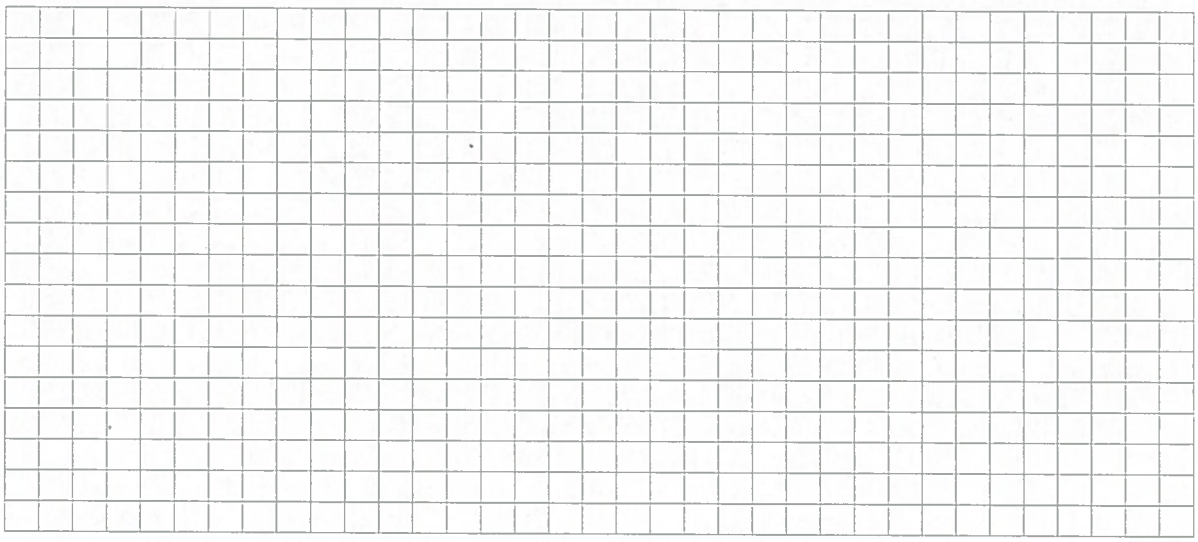
Stream Info

LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☒ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: same as E-5, clear w/ few shrubs, some sediment



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Stream: GEF_100	**Field Grid:** EF-7	**HMS Subbasin:**

OBJECTID: 104	Upstream face of bridge on north west side of TX-105.	OBJECTID: 102	Downstream face of bridge on north west side of TX-105.

OBJECTID: 106	Upstream face of bridge on east side of TX-105.	OBJECTID: 108	Channel upstream of TX-105.

Bridge Data Sheet

Crossing No.: _____

Road: TX-105 Date: _____

River: East Fork EF-7 Job No.: _____

Bridge Info

Piers No. of Piers: _____ Pier Dia.: _____ Pier Spacing: _____

Piers type Circular ☒ Elliptical ☐ Other ☐

Other Description: _____

Bridge Width (as the stream flows): _____ Bridge Length: _____

Deck Thickness _____ Abutments SS: ____ : 1 ACB abutment.

Bridge Clearance (from low chord to stream invert): _____

Additional Info: Will request survey / TXDOT as built

water crosses near exit ramp and runs parallel to the bridge.

Stream Info

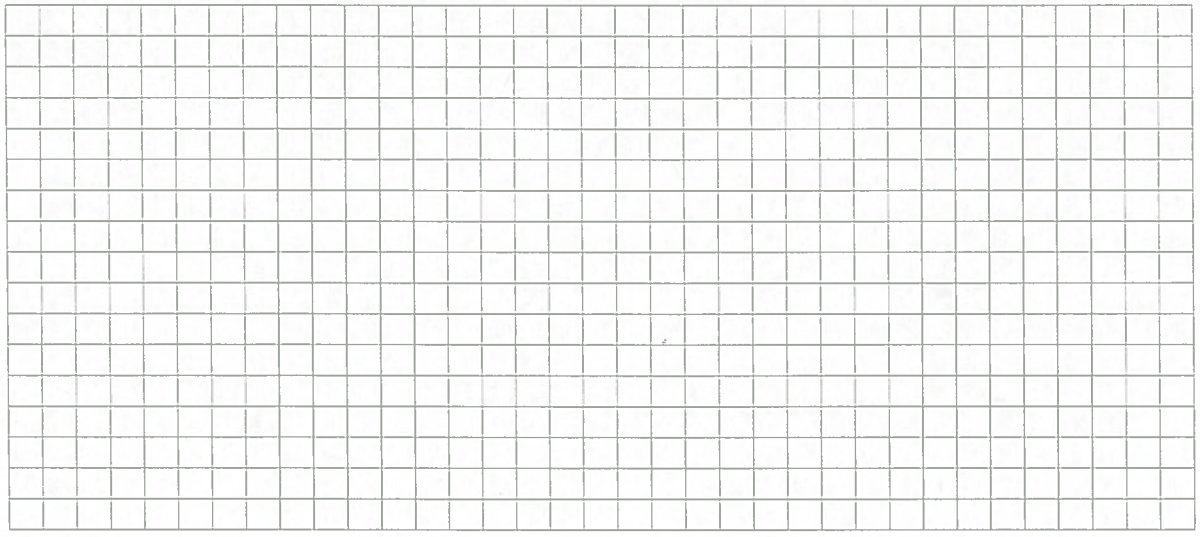
LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☐ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: _____

_____



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Stream: GEF_100		**Field Grid:** EF-8	**HMS Subbasin:**
OBJECTID: 113	Downstream face of the crossing.	OBJECTID: 116	Main channel under the bridge crossing.
			
OBJECTID: 114	Facing upstream channel from the downstream end.	OBJECTID: 118	Channel downstream of TX-105.
			

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Stream: GEF_100		**Field Grid:** EF-10	**HMS Subbasin:**
OBJECTID: 3	Crossing at the main channel.	OBJECTID: 4	Upstream face of crossing at CR 388.

OBJECTID: 7	Sediment buildup on downstream side of the crossing.	OBJECTID: 11	Channel upstream of CR 388.

Bridge Data Sheet

Crossing No.: EF-10

Road: _____ Date: _____

River: East Fork EF-10 Job No.: _____

Bridge Info

guard rail 28"

u Bents

Piers No. of Piers: _____ Pier Dia.: 14" wide Pier Spacing: _____

Piers type Circular ☐ Elliptical ☐ Other ☒ &

Other Description: square

Bridge Width (as the stream flows): _____ Bridge Length: _____

18" drop

Deck Thickness 15" Abutments SS: ____ : 1 use same slope as us crossings.

Bridge Clearance (from low chord to stream invert): _____

Additional Info: Downstream end has a lot of sediment buildup. Last 3 bents with little to no on right DS side, no water flow, lots of deposition.

looks like water could be overtopping the road a little past the bridge, may need a lateral structure for bypass

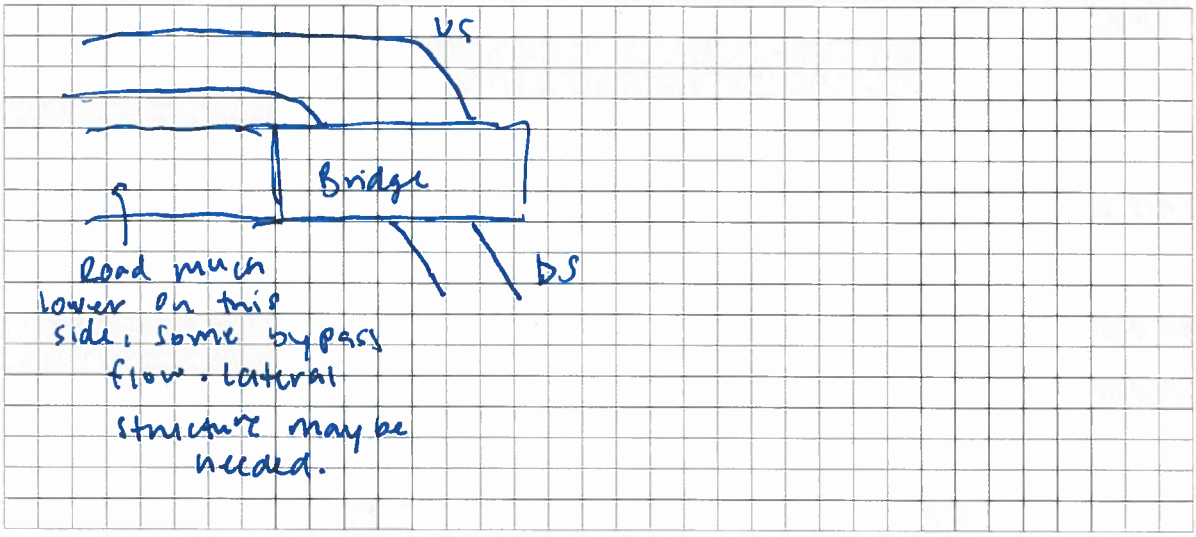
Stream Info

LOB N-Value: woody Channel N-Value: _____ ROB N-Value: woody

Channel Type: Natural ☐ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: Very sandy channel, lots of debris, DS right lots of sediment buildup



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Stream: GEF_100		**Field Grid:** EF-11	**HMS Subbasin:**
OBJECTID: 133	Upstream face of crossing at FM 945.	OBJECTID: 131	Downstream face of crossing at FM 945.

OBJECTID: 135	Channel upstream of FM 945.	OBJECTID: 132	Channel downstream of FM 945.

Bridge Data Sheet

Crossing No.: FF-11

Road: FM 945 Date: _____

River: _____ Job No.: _____

Bridge Info

Piers No. of Piers: 1 Pier Dia.: 14" Pier Spacing: _____

Piers type Circular ☐ Elliptical ☐ Other ☒ Square

Other Description: _____

Bridge Width (as the stream flows): _____ Bridge Length: _____

Deck Thickness ~~42"~~ Abutments SS: 2 : 1

Bridge Clearance (from low chord to stream invert): _____

Additional Info: +9" for guardrail (51" total)

_____

Stream Info

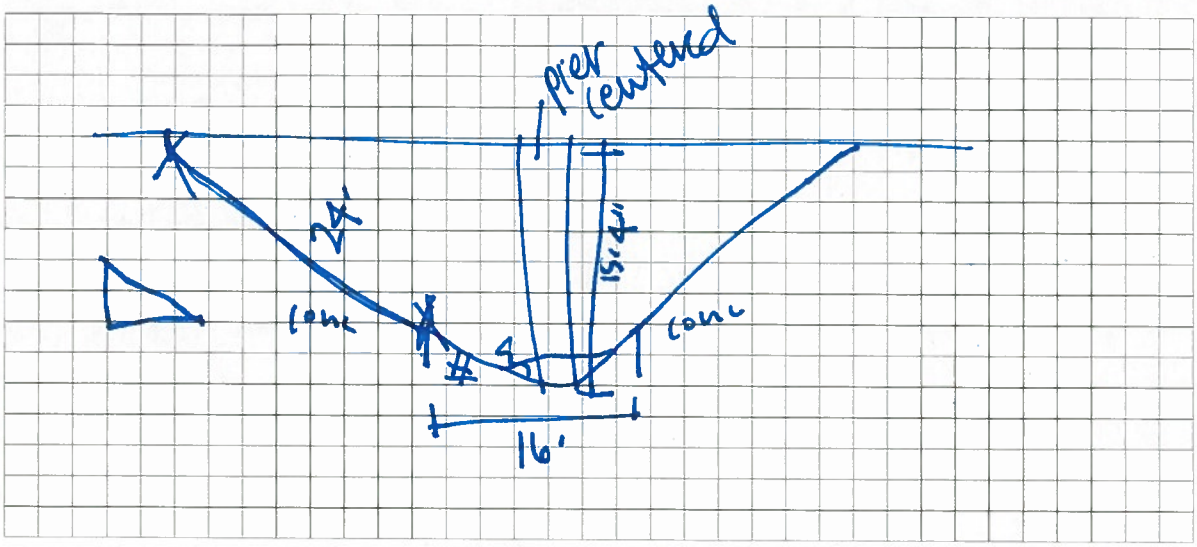
LOB N-Value: .07 Channel N-Value: .04 ROB N-Value: .07

Channel Type: Natural ☒ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: _____ : 1

Channel Depth: _____ Additional Info: _____

_____



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Stream: GEF_100		**Field Grid:** EF-15	**HMS Subbasin:**
OBJECTID: 15	Upstream face of crossing at Lower Vann Rd.	OBJECTID: 18	Downstream face of crossing at Lower Vann Rd.

OBJECTID: 20	Channel downstream of Lower Vann Rd.	OBJECTID: 14	Channel upstream of Lower Vann Rd.

Bridge Data Sheet

Crossing No.: _____

Road: Lower Vann Rd. Date: _____

River: East Fork EF-15 Job No.: _____

Bridge Info

Piers No. of Piers: 2 Pier Dia.: 10" width Pier Spacing: _____

Piers type Circular ☐ Elliptical ☐ Other ☒

Other Description: guard rail 33" tall

Bridge Width (as the stream flows): _____ Bridge Length: _____

Deck Thickness 22" Abutments SS: _____ : 1

Bridge Clearance (from ~~low chord~~ top to stream invert): 128"

Additional Info: overbanks overgrown, road seems to overtop a lot, lots of debris along guardrail

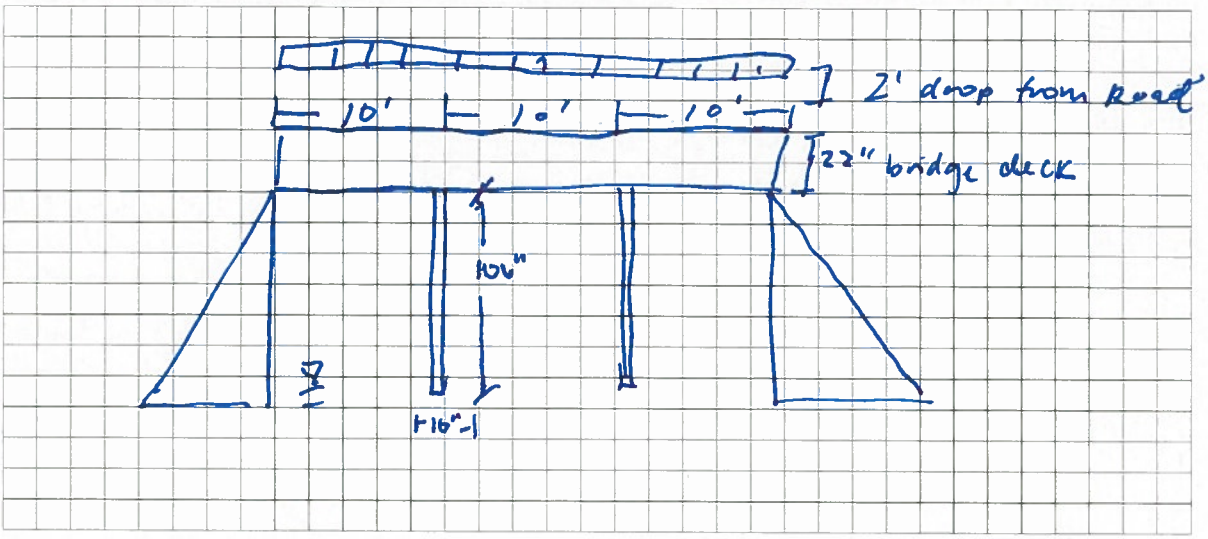
Stream Info

LOB N-Value: Woody Channel N-Value: _____ ROB N-Value: Woody

Channel Type: Natural ☒ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: _____ : 1

Channel Depth: _____ Additional Info: Channel Sandy, some debris us blocking opening



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Stream: GEF_100	**Field Grid:** EF-16	**HMS Subbasin:**

OBJECTID: 22	Upstream face of crossing at S Butch Arthur Rd.	OBJECTID: 27	Downstream face of crossing at S Butch Arthur Rd.

OBJECTID: 25	Main channel facing downstream of the crossing.	OBJECTID: 23	Channel upstream of S Butch Arthur Rd.

Bridge Data Sheet

Crossing No.: _____

Road: Cold Springs Oil Field Rd / Buta Arthur St. Date: _____

River: East Fork - EF-16 Job No.: _____

Bridge Info 2 Bents (along channel edge)

Piers No. of Piers: _____ Pier Dia.: 16" Pier Spacing: _____

Piers type Circular ☐ Elliptical ☐ Other ☒ Square

Other Description: _____

Bridge Width (as the stream flows): _____ Bridge Length: 128'

Deck Thickness 3' w/ 18" drop Abutments SS: ____ : 1

- edge of abutment

Bridge Clearance (from low chord to stream invert): _____

Additional Info: Road sign says impassable during rain, _____

_____

Stream Info

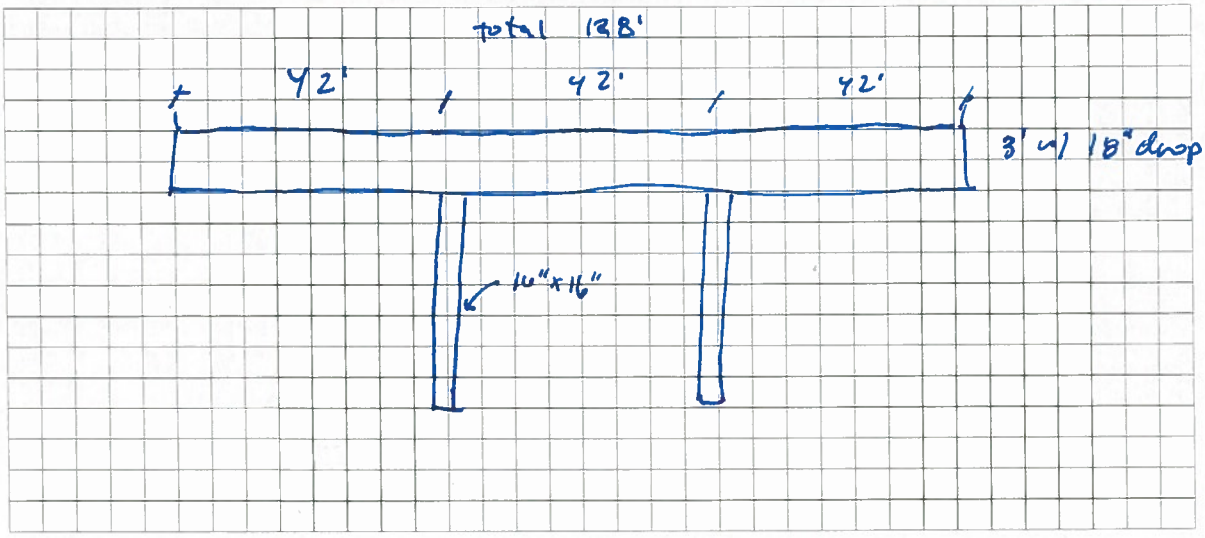
LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: woody, overgrown

Channel Type: Natural ☐ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: clear channel, pretty sandy

_____



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Stream: GEF_100		**Field Grid:** EF-17	**HMS Subbasin:**
OBJECTID: 35	Upstream face of crossing at TX-150	OBJECTID: 39	Downstream face of crossing at TX-150.

OBJECTID: 38	Sediment buildup on the west side on the crossing.	OBJECTID: 41	Main channel under the crossing.

Bridge Data Sheet

Crossing No.: _____

Road: TX-190 Date: _____

River: East Fork, EF-17 Job No.: _____

Bridge Info

Piers No. of Piers: 8 bents / 4 ea. Pier Dia.: 14" Pier Spacing: _____

Piers type Circular ☐ Elliptical ☐ Other ☒ square

Other Description: ~30' between Bents

Bridge Width (as the stream flows): _____ Bridge Length: _____

Deck Thickness 2' (18" for guard rail) Abutments SS: ____ : 1

29" drop on abutment

Bridge Clearance (from low chord to stream invert): 75"

Additional Info: _____

_____

Stream Info

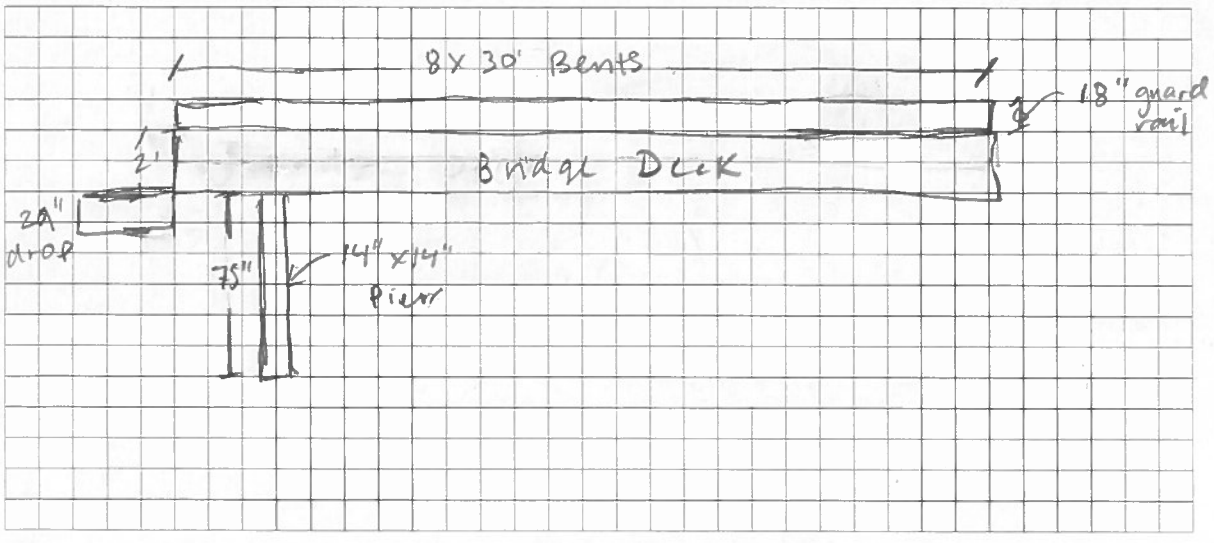
ROB flat pretty clear right by Bridge

LOB N-Value: Woody Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☑ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: Banks overgrown, clear sandy bottom



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Stream: GEF_100		**Field Grid:** EF-18	**HMS Subbasin:**
OBJECTID: 155	Upstream face of crossing at FM 945.	OBJECTID: 144	Downstream face of crossing at FM 945.

OBJECTID: 142	Channel downstream of FM 945.	OBJECTID: 152	Channel upstream of FM 945.

Bridge Data Sheet

Crossing No.: EF 18

Road: EF 18 FM 945/ RR 2 Date: 4-29-19

River: East Fork San Jacinto Job No.: HAF19300

Bridge Info Picture order: DS chnl, DS face, over, US chnl, US face

Piers No. of Piers: 3 Pier Dia.: 14"x14" Pier Spacing: 25'

Piers type Circular ☐ Elliptical ☐ Other ☑ square

Other Description: no apparent skew

Bridge Width (as the stream flows): 23 Bridge Length: 75'

Deck Thickness 4' Abutments SS: ____ : 1

Bridge Clearance (from low chord to ~~stream invert~~ WSE): 13'

Additional Info: stream invert not visible through water

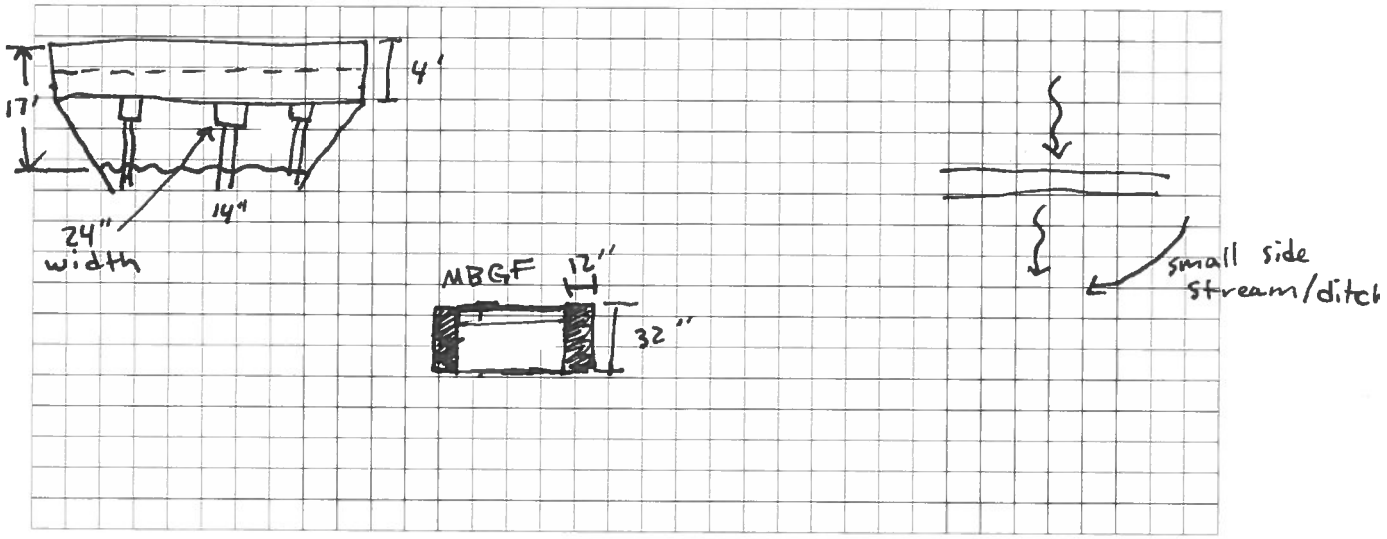
Stream Info

LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☑ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: _____



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Stream: GEF_100		**Field Grid:** EF-22	**HMS Subbasin:**
OBJECTID: 175	Upstream side of crossing at Jenkins Rd.	OBJECTID: 163	Downstream face of crossing at Jenkins Rd.

OBJECTID: 165	Channel downstream of crossing.	OBJECTID: 179	Channel upstream of crossing.

Bridge Data Sheet

Crossing No.: EF-22

Road: EF 22 Jenkins Rd Date: 4-29-19

River: East Fork San Jacinto Job No.: HAF19300

Bridge Info Pictures: US Chnl, DS chnl

Piers No. of Piers: 1 Pier Dia.: 2'x2' Pier Spacing: _____

Piers type Circular ☐ Elliptical ☐ Other ☑ square

Other Description: no apparent skew

Bridge Width (as the stream flows): 25' Bridge Length: 58'

Deck Thickness 24" Abutments SS: ____ : 1

Bridge Clearance (from low chord to ~~stream invert~~ WSE): 11' 4"

Additional Info: natural ground abutments w/ remnants of rock; evidence of debris reaching deck height (branches on fence)

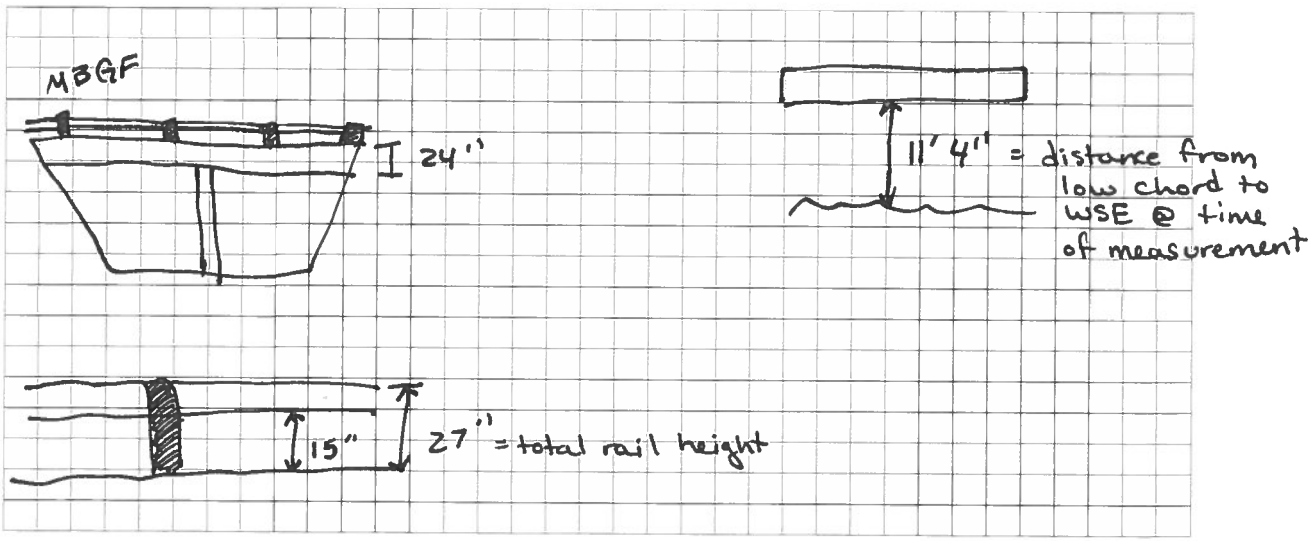
Stream Info

LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☐ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: _____



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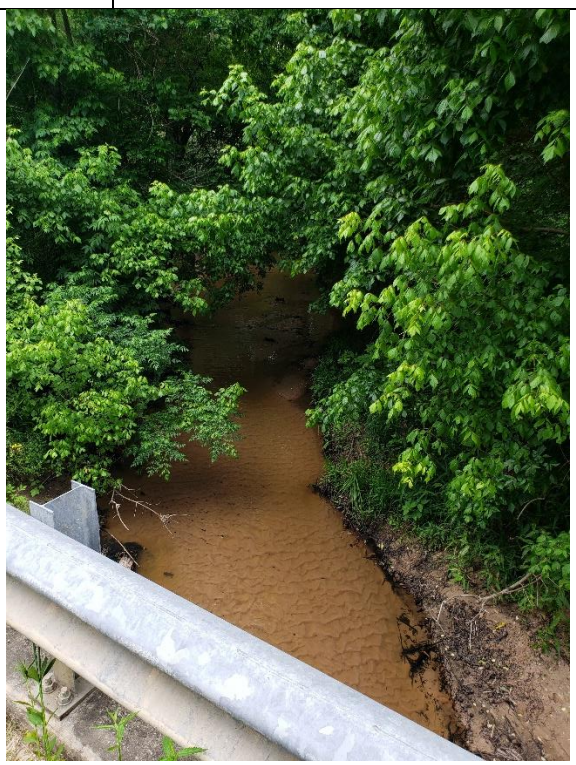
Stream: GEF_100		**Field Grid:** EF-23	**HMS Subbasin:**
OBJECTID: 155	Channel upstream of Guinea Rd.	OBJECTID: 184	Channel downstream of Guinea Rd.



OBJECTID: 187	Sediment build up on the upstream side of the crossing.	OBJECTID: 183	Sediment and debris build up on the downstream side of the crossing.

Culvert Data Sheet

Crossing No.: EF - 23

Road: Guinea Rd Date: 4-29-19

Stream: East Fork San Jacinto Job No.: HAF19300

Culvert Info

Culvert Type: Box ☑ Pipe ☐ Other ☐

Material: Concrete ☑ CMP ☐ Other ☐

Headwall Type: Wingwalls ☐ No wingwalls ☑

Culverts No. of Culverts: 3 Width: 10' Height: 10' Diameter

Culvert wall thickness between barrels = 7"

No. of Culverts: _____ Width: _____ Height: _____ Diameter

Other Description: large skew

Culvert Length (as the stream flows): 28' ⊥ Deck Thickness: 2'

Additional Info: _____

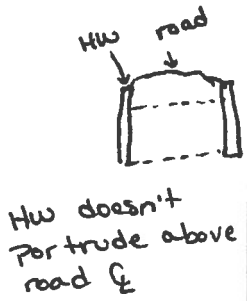
Stream Info

LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

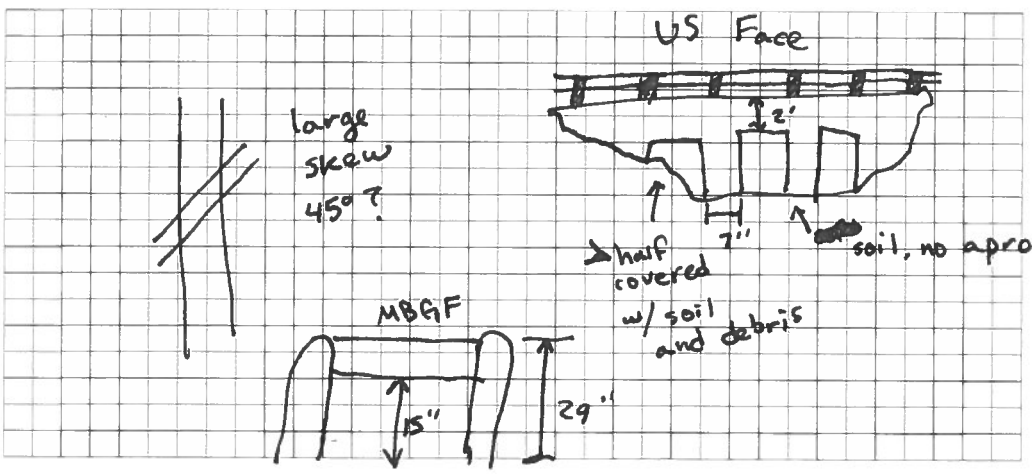
Channel Type: Natural ☑ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: heavy debris covering one of the outer culvert barrels



HW doesn't protrude above road ℄



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Stream: GEF_100		**Field Grid:** EF-25	**HMS Subbasin:**
OBJECTID: 202	Upstream face of crossing at US-190.	OBJECTID: 197	Downstream face of crossing at US-190.

OBJECTID: 192	Channel downstream of crossing.	OBJECTID: 199	Channel upstream of crossing.

Culvert Data Sheet

Crossing No.: EF-25

Road: US190 Date: 4-29-19

Stream: East Fork San Jacinto Job No.: HAF19300

Culvert Info us chnl, us face, overtop

Culvert Type: Box ☑ Pipe ☐ Other ☐

Material: Concrete ☑ CMP ☐ Other ☐

Headwall Type: Wingwalls ☑ No wingwalls ☐

Culverts No. of Culverts: 6 Width: 10' Height: 10' Diameter

No. of Culverts: _____ Width: _____ Height: _____ Diameter

Other Description: concrete apron to edge of wings

Culvert Length (as the stream flows): 45' Deck Thickness: 30"

Additional Info: length obtained from Google Earth
road too busy to measure in field

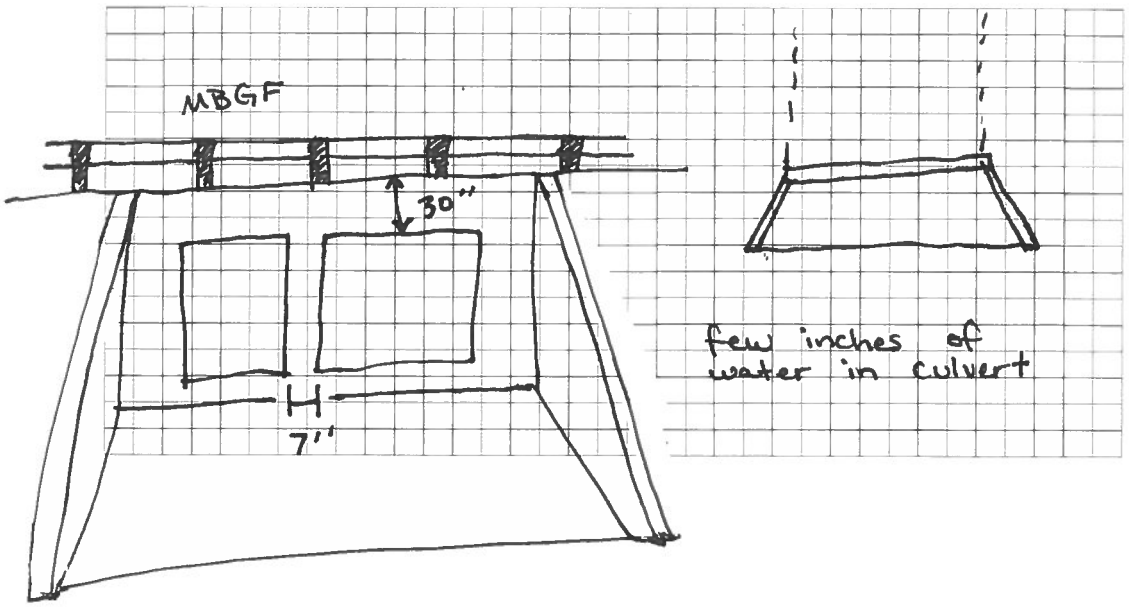
Stream Info

LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☑ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: _____



HW doesn't protrude beyond road ℄

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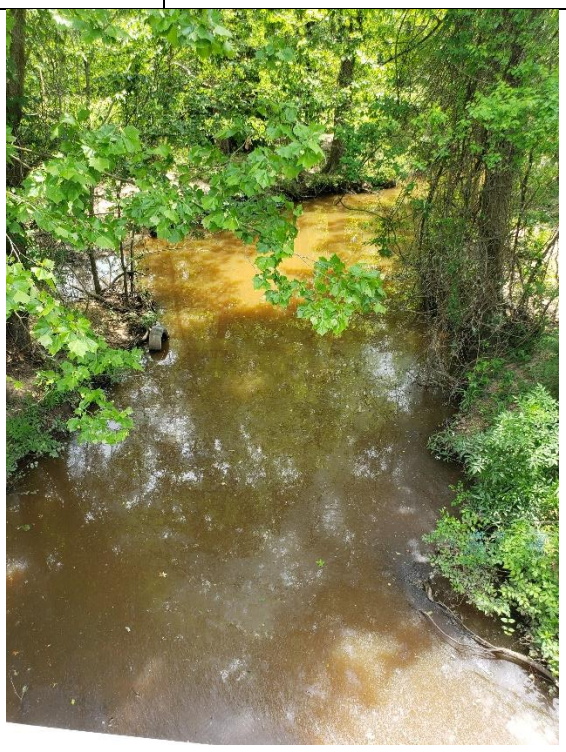
Stream: GEF_100		**Field Grid:** EF-26	**HMS Subbasin:**
OBJECTID: 222	Upstream face of crossing at Dodge-Oakhurst Rd.	OBJECTID: 212	Downstream face of crossing at Dodge-Oakhurst Rd.

OBJECTID: 215	Channel downstream of crossing.	OBJECTID: 224	Channel upstream of crossing.



Bridge Data Sheet

Crossing No.: EF26

Road: Dodge - Oakhurst Rd Date: 4-29-19

River: East Fork San Jacinto Job No.: HAF19300

Bridge Info DS Chnl, Overtop, US Chnl

Piers No. of Piers: 0 Pier Dia.: / Pier Spacing: /

Piers type Circular ☐ Elliptical ☐ Other ☐

Other Description: _____

Bridge Width (as the stream flows): 30' Bridge Length: 40'

Deck Thickness 2' Abutments SS: ____ : 1

Bridge Clearance (from low chord to stream invert): _____

Additional Info: metal plates as wingwalls on one side, natural ground on other side

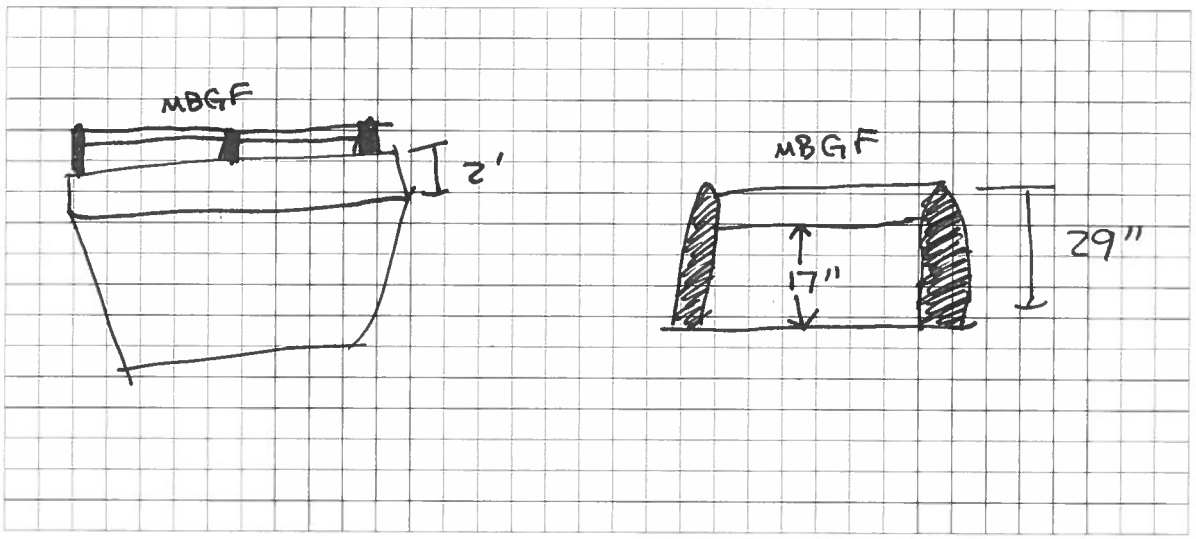
Stream Info

LOB N-Value: _____ Channel N-Value: _____ ROB N-Value: _____

Channel Type: Natural ☑ Concrete ☐ Other ☐ Describe: _____

Bottom Width: _____ Top Width: _____ Channel SS: ____ : 1

Channel Depth: _____ Additional Info: _____



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Stream: GEF_100		**Field Grid:** EF-27	**HMS Subbasin:**
OBJECTID: 236	Upstream face of crossing at Stanley Rd.	OBJECTID: 227	Downstream face of crossing at Stanley Rd.

OBJECTID: 128	Channel downstream of crossing.	OBJECTID: 233	Channel upstream of crossing.

Culvert Data Sheet

Crossing No.: EF 27

Road: Stanley Rd Date: 4-29-19

Stream: East Fork San Jacinto Job No.: HAF19300

Culvert Info

Culvert Type: Box ☐ Pipe ☑ Other ☐

Material: Concrete ☐ CMP ☐ Other ☑ smooth steel

Headwall Type: Wingwalls ☐ No wingwalls ☑

Culverts No. of Culverts: 1 Width: 9' Ø Height: ____ Diameter

No. of Culverts: ____ Width: ____ Height: ____ Diameter

Other Description: ____

Culvert Length (as the stream flows): 40' Deck Thickness: ~1' @ PGL

Additional Info: road width ≈ 30'

evidence of debris (on fence) at height of road

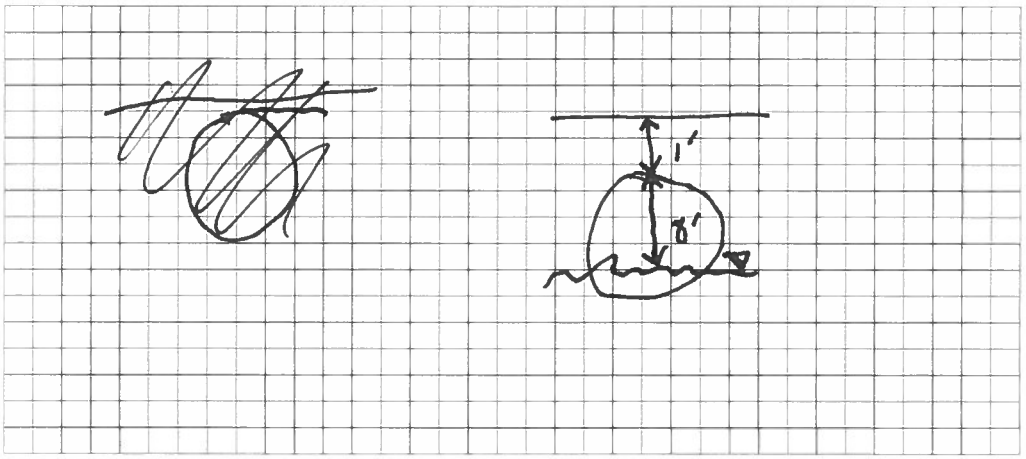
Stream Info

LOB N-Value: ____ Channel N-Value: ____ ROB N-Value: ____

Channel Type: Natural ☑ Concrete ☐ Other ☐ Describe: ____

Bottom Width: ____ Top Width: ____ Channel SS: ____ : 1

Channel Depth: ____ Additional Info: ____



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FIELD OBSERVATION REPORT

Project: San Jacinto Regional Watershed Master Drainage Plan

Report number: 1

Client: Harris County Flood Control District

Date: 4/18/2019- 4/19/2019, 4/23/2019

Subject: Field Reconnaissance – Spring Creek (J100-00-00) AVO: **33465**

WEATHER

- ☒ Clear
- ☐ Overcast
- ☐ Rain
- ☐ Snow
- ☐ Foggy
- ☐ Cold
- ☒ Warm
- ☐ Hot

SITE CONDITIONS

- ☒ Clear
- ☐ Muddy
- ☐ Dusty

Temperature: 70-degrees

DAY

- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☒ Thursday
- ☐ Friday

OBSERVATIONS:

As part of the Upper San Jacinto Regional Watershed Flood Mitigation project, a field reconnaissance effort was conducted for J100-00-00, Spring Creek. The primary objective of the field visit is to document the crossing structures of Spring Creek. Photographs obtained from the field visit are presented in this report. A map showing their locations is included at the end of the document.

Spring Creek is in the northwestern portion of Harris County and is a grass-lined natural channel. Access was usually limited to those areas immediately around the structures.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127414_a	View of channel upstream of culvert on FM 1736 between Waller Gladish Rd. and Mellman Rd.	OBJECTID: 127414_b	Face of 5' W x3' H double barrel culvert on upstream side of FM 1736 between Waller Gladish Rd. and Mellman Rd..

OBJECTID: 127414_c	View past fence. View of channel upstream of culvert on FM 1736 between Waller Gladish Rd. and Mellman Rd.	OBJECTID: 127413_a	Face of 5' W x3' H double barrel culvert on downstream side of FM 1736 between Waller Gladish Rd. and Mellman Rd..

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127413_b	View of channel downstream of culvert on FM 1736 between Waller Gladish Rd. and Mellman Rd.	OBJECTID: 127415_a	View of channel upstream of FM 1736 between Waller Gladish Rd. and Mitchell Rd.

OBJECTID: 127415_b	Face of 6' W x 5' H culvert on upstream side of FM 1736 between Waller Gladish Rd. and Mitchell Rd.	OBJECTID: 127813_a	Face of 6' W x 5' H culvert on downstream side of FM 1736 between Waller Gladish Rd. and Mitchell Rd.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127813_b	View of channel downstream of FM 1736 between Waller Gladish Rd. and Mitchell Rd.	OBJECTID: 127813_c	Roadside ditch along FM 1736 between Waller Gladish Rd. and Mitchell Rd. with noticeable erosion.

OBJECTID: 127814_a	Face of 6' W x 5' H double barrel culvert on upstream side of FM 1736 between Mitchell Rd. and FM 1488.	OBJECTID: 127814_b	View of channel upstream of FM 1736 between Mitchell Rd. and FM 1488. This follows the road briefly.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127815_a	View of channel upstream of FM 1736 between Mitchell Rd. and FM 1488.	OBJECTID: 127815_b	Face of 6' W x 5' H double barrel culvert on downstream side of FM 1736 between Mitchell Rd. and FM 1488.

OBJECTID: 127815_c	View of channel upstream of FM 1736 between Mitchell Rd. and FM 1488 with noticeable bank erosion.	OBJECTID: 127816_a	Roadside ditch on upstream side of FM 1736 between Mitchell Rd. and FM 1488 with noticeable bank erosion. Facing South.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127816_b	Roadside ditch on upstream side of FM 1736 between Mitchell Rd. and FM 1488 with noticeable bank erosion. Facing North.

OBJECTID: 127816_c	View of channel upstream of FM 1736 between Mitchell Rd. and FM 1488. Large amounts of ponding in front of culvert.

OBJECTID: 127816_d	Face of 5.5' W x 5' H triple barrel culvert on upsteream side of FM 1736 between Mitchell Rd. and FM 1488.

OBJECTID: 127816_e	View of channel upstream of FM 1736 between Mitchell Rd. and FM 1488. Large amounts of ponding in front of culvert.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
127817_a	View of channel downstream of FM 1736 between Mitchell Rd. and FM 1488. Large amounts of ponding in front of culvert.

OBJECTID:	
127817_b	Face of 5.5' W x 5' H triple barrel culvert on downstream side of FM 1736 between Mitchell Rd. and FM 1488.

OBJECTID:	
127817_c	View of channel downstream of FM 1736 between Mitchell Rd. and FM 1488. Large amounts of ponding in front of culvert.

OBJECTID:	
127819_a	View of channel downstream of FM 1488 between FM 1736 and Joseph Rd. High levels of ponding in front of culvert.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127819_b	View of channel downstream of FM 1488 between FM 1736 and Joseph Rd. High levels of ponding in front of culvert. Evident erosion.

OBJECTID: 127818_a	View of channel upstream of FM 1488 between FM 1736 and Joseph Rd. High levels of ponding in front of bridge.

OBJECTID: 127818_b	Face of bridge on upstream side of FM 1736 between Mitchell Rd. and FM 1488.

OBJECTID: 127818_c	View of channel upstream of FM 1488 between FM 1736 and Joseph Rd. High levels of ponding in front of bridge.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127818_d	View of channel upstream of FM 1488 between FM 1736 and Joseph Rd. High levels of ponding in front of bridge.

OBJECTID: 127820_a	Culvert intake on upstream side of Fields Store Rd.

OBJECTID: 127820_b	View of channel upstream of Fields Store Rd. between Mayer Rd. and Joseph Rd.

OBJECTID: 127820_c	View of channel upstream of Fields Store Rd. between Mayer Rd. and Joseph Rd.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127820_d	View of channel upstream of Fields Store Rd. between Mayer Rd. and Joseph Rd.	OBJECTID: 127820_e	Face of 10' W x 7' H, 4 barrel culvert on upstream side of Fields Store Rd. between Joseph Rd. and Mayer Rd.

OBJECTID: 127821_a	View of channel downstream of Fields Store Rd. between Mayer Rd. and Joseph Rd. High amounts of collected debris.	OBJECTID: 127821_b	View of channel downstream of Fields Store Rd. between Mayer Rd. and Joseph Rd. High amounts of collected debris.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127821_c	View of channel downstream of Fields Store Rd. between Mayer Rd. and Joseph Rd. High amounts of collected debris.	OBJECTID: 127821_d	Culvert intake on upstream side of Fields Store Rd.

OBJECTID: 127824_a	Face of bridge on upstream side of Kickapoo Rd. between Joseph Rd. and Castle Rd.	OBJECTID: 127824_b	View of channel upstream of Kickapoo Rd. between Castle Rd. and Joseph Rd. Light bank and channel vegetation.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127824_c	Underside of bridge on upstream side of Kickapoo Rd. between Joseph Rd. and Castle Rd. Looking upstream.

OBJECTID: 127823_a	View of channel downstream of Kickapoo Rd. between Castle Rd. and Joseph Rd. Moderate bank vegetation.

OBJECTID: 127823_b	Overgrown roadside ditch on downstream side of Kickapoo Rd. Facing North.

OBJECTID: 127823_c	Face of bridge on downstream side of Kickapoo Rd. between Joseph Rd. and Castle Rd.

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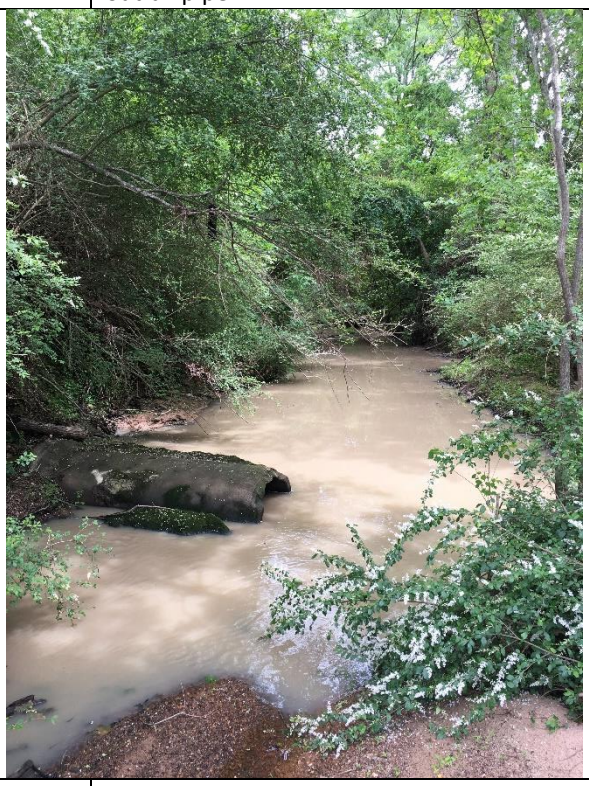
Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127823_d	View of channel downstream of Kickapoo Rd. between Castle Rd. and Joseph Rd. from below bridge.

OBJECTID: 127829_a	View of channel downstream of Margerstadt Rd. between Kickapoo Rd. and Hegar Rd. Defunct outfall pipe.



OBJECTID: 127829_b	View of channel downstream of Margerstadt Rd. between Kickapoo Rd. and Hegar Rd. Moderate bank vegetation.

OBJECTID: 127829_c	Face of bridge on downstream side of Margerstadt Rd. between Kickapoo Rd. and Hegar Rd.

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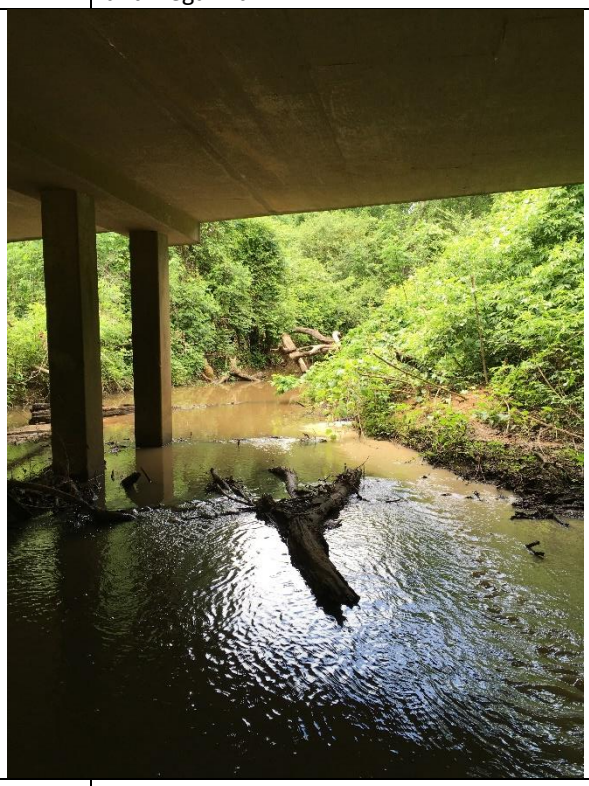
Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127829_d	View of channel facing upstream from under the bridge on Margerstadt Rd. between Kickapoo Rd. and Hegar Rd.



OBJECTID: 127829_e	View of channel facing upstream from under the bridge on Margerstadt Rd. between Kickapoo Rd. and Hegar Rd.

OBJECTID: 127829_f	View of channel upstream of Margerstadt Rd. between Kickapoo Rd. and Hegar Rd. Moderate bank vegetation and some channel debris.

OBJECTID: 127829_g	Face of bridge on uptream side of Margerstadt Rd. between Kickapoo Rd. and Hegar Rd.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127829_h	View of channel facing upstream from under the bridge on Margerstadt Rd. between Kickapoo Rd. and Hegar Rd.

OBJECTID: 127831_a	Face of bridge on upstream side of Hegar Rd. between Waller Spring Creek Rd. and Magnolia Rd.

OBJECTID: 127831_b	Face of bridge on upstream side of Hegar Rd. between Waller Spring Creek Rd. and Magnolia Rd.

OBJECTID: 127831_c	View of channel upstream of Hegar Rd. between Waller Spring Creek Rd. and Magnolia Rd. Moderate channel vegetation.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127831_d	View of channel upstream of Hegar Rd. between Waller Spring Creek Rd. and Magnolia Rd. Moderate channel vegetation.

OBJECTID: 127831_e	Face of bridge on downstream side of Hegar Rd. between Waller Spring Creek Rd. and Magnolia Rd.

OBJECTID: 127831_f	View of channel downstream of Hegar Rd. between Waller Spring Creek Rd. and Magnolia Rd.

OBJECTID: 127831_g	High water mark visible in crushed vegetation.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
127833_a	View of channel upstream of Nichols Rd. between FM 2920 and Murrell Rd. Moderate bank vegetation.

OBJECTID:	
127833_b	View of channel upstream of Nichols Rd. between FM 2920 and Murrell Rd. Moderate bank vegetation.

OBJECTID:	
127833_c	Face of bridge on upstream side of Nichols Rd. between FM 2920 and Murrell Rd.

OBJECTID:	
127834_a	View of channel upstream of Nichols Rd. between FM 2920 and Murrell Rd. Moderate bank vegetation.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127834_b	Face of bridge on downstream side of Nichols Rd. between FM 2920 and Murrell Rd.

OBJECTID: 127836_a	View of channel upstream of Roberts Cemetery Rd. between FM 2920 and Michael Ln. Moderate bank vegetation.

OBJECTID: 127836_b	Face of bridge on upstream side of Roberts Cemetery Rd. between FM 2920 and Michael Ln.

OBJECTID: 127838_a	View of channel downstream of Roberts Cemetery Rd. between FM 2920 and Michael Ln. Moderate bank vegetation.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127838_b	Face of bridge on downstream side of Roberts Cemetery Rd. between FM 2920 and Michael Ln.	OBJECTID: 127839_a	Bridge facing northward on Cardinal Dr.

OBJECTID: 127839_b	Face of bridge on upstream side of Cardinal Dr. between Jay Way St. and Quast Dr.	OBJECTID: 127839_c	View of channel upstream of Cardinal Dr. between Jay Way St. and Quast Dr.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
127839_d	View of channel upstream of Cardinal Dr. between Jay Way St. and Quast Dr.

OBJECTID:	
127840_a	View of channel downstream of Cardinal Dr. between Jay Way St. and Quast Dr.

OBJECTID:	
127840_b	View of channel downstream of Cardinal Dr. between Jay Way St. and Quast Dr.

OBJECTID:	
127840_c	Face of bridge on downstream side of Cardinal Dr. between Jay Way St. and Quast Dr.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127841_a	View of channel upstream of Mueschke Rd. between Sanders Cemetery Rd. and FM 2920.

OBJECTID: 127841_b	Face of 11' W x 10' H, 6 barrel culvert on upstream side of Mueschke Rd. between Sanders Cemetery Rd. and FM 2920.

OBJECTID: 127842_a	View of channel downstream of Mueschke Rd. between Sanders Cemetery Rd. and FM 2920.

OBJECTID: 127842_b	View of channel downstream of Mueschke Rd. between Sanders Cemetery Rd. and FM 2920. Channel geometry narrows downstream of bridge.

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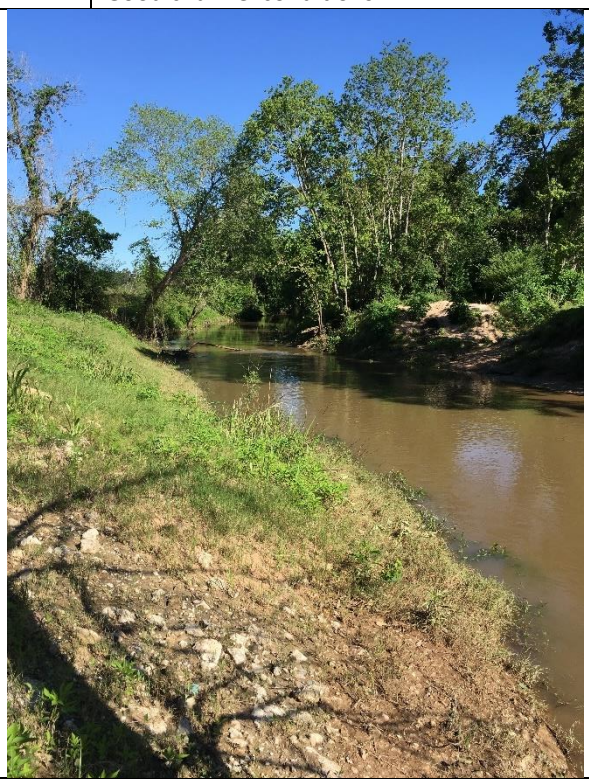
Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 127842_c	Face of 11' W x 10' H, 6 barrel culvert on downstream side of Mueschke Rd. between Sanders Cemetery Rd. and FM 2920.

OBJECTID: 127842_d	Face of 11' W x 10' H, 6 barrel culvert on downstream side of Mueschke Rd. between Sanders Cemetery Rd. and FM 2920.

OBJECTID: 128214_a	View of channel upstream of Decker Prairie Rosehill Rd between FM2920 and Coe Loop. Good channel conditions.



OBJECTID: 128214_b	Face of bridge on upstream side of Decker Prairie Rosehill Rd between FM2920 and Coe Loop.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128214_c	Face of bridge on upstream side of Decker Prairie Rosehill Rd between FM2920 and Coe Loop.

OBJECTID: 128214_d	Roadside ditch culver leading to upstream side of bridge.

OBJECTID: 128215_a	View of channel downstream of Decker Prairie Rosehill Rd between FM2920 and Coe Loop. Good channel conditions.

OBJECTID: 128215_b	View of channel downstream of Decker Prairie Rosehill Rd between FM2920 and Coe Loop. Good channel conditions.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128215_c	Underside of bridge on Decker Prairie Rosehill Rd between FM2920 and Coe Loop.	OBJECTID: 128215_d	Face of bridge on downstream side of Decker Prairie Rosehill Rd between FM2920 and Coe Loop.

OBJECTID: 128216_a	Detention pond on upstream side of 249. Currently still under construction.	OBJECTID: 128216_b	Detention pond on upstream side of 249. View from under the bridge. Currently still under construction.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
128216_c	Detention pond on upstream side of 249. Currently still under construction.

OBJECTID:	
128219_a	View of channel upstream of 249 between Sentinel Oaks and Zion Rd.

OBJECTID:	
128219_b	Face of bridge on upstream of 249 between Sentinel Oaks and Zion Rd.

OBJECTID:	
128219_c	Face of bridge on upstream of 249 between Sentinel Oaks and Zion Rd. Outfall culvert under construction.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128219_d	Another outfall on upstream of 249 between Sentinel Oaks and Zion Rd.	OBJECTID: 128219_e	Face of bridge on upstream of 249 between Sentinel Oaks and Zion Rd.

OBJECTID: 128217_a	Face of bridge on downstream of 249 between Sentinel Oaks and Zion Rd.	OBJECTID: 128217_b	View of channel downstream of 249 between Sentinel Oaks and Zion Rd. Some channel debris and moderate bank vegetation.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	Face of bridge on upstream of Huffsmith Kohrville Rd. between Dobbin Hufsmith Rd. and Bogs Rd.
128220_a	

OBJECTID:	Face and underside of bridge on upstream of Huffsmith Kohrville Rd. between Dobbin Hufsmith Rd. and Bogs Rd.
128220_b	

OBJECTID:	View of channel upstream of Huffsmith Kohrville Rd. between Dobbin Hufsmith Rd. and Bogs Rd.
128220_c	

OBJECTID:	View of channel upstream of Huffsmith Kohrville Rd. between Dobbin Hufsmith Rd. and Bogs Rd.
128222_a	

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128222_b	View of channel upstream of Huffsmith Kohrville Rd. between Dobbin Hufsmith Rd. and Bogs Rd. Some channel debris.

OBJECTID: 128222_c	Face of bridge on downstream of Huffsmith Kohrville Rd. between Dobbin Hufsmith Rd. and Bogs Rd. Currently under construction.

OBJECTID: 128222_d	Face of bridge on downstream of Huffsmith Kohrville Rd. between Dobbin Hufsmith Rd. and Bogs Rd.

OBJECTID: 129013_a	Drainage structure on upstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr.

HALFF

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 129013_b	Drainage structure on upstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr.

OBJECTID: 129013_c	Drainage outfall on upstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr. 3 of these outfalls are along the drainage structure.

OBJECTID: 128223_a	Face of bridge on upstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr.

OBJECTID: 128223_b	View of channel upstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr.

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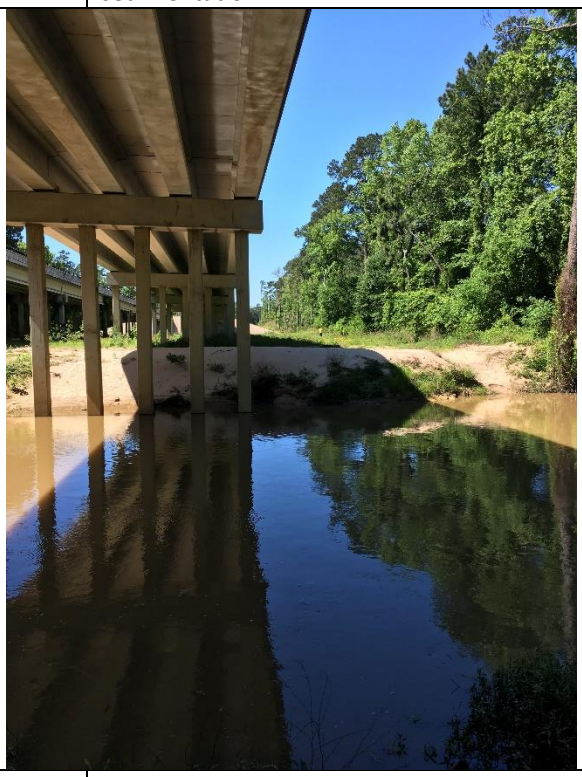
Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128223_c	Underside of bridge on upstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr. Evident sedimentation.



OBJECTID: 128223_d	Underside of bridge on upstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr. Evident erosion.

OBJECTID: 128224_a	Face of bridge on downstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr.

OBJECTID: 128224_b	View of channel downstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr.

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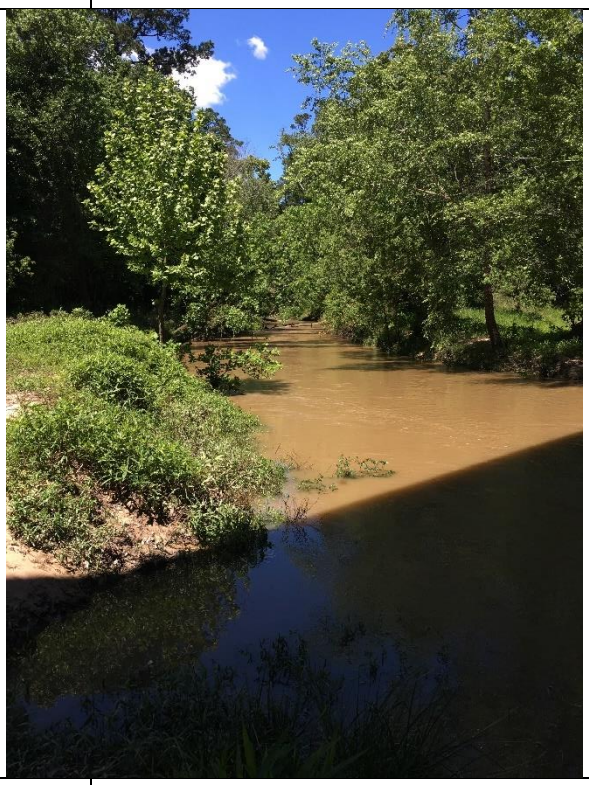
Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128225_a	Drainage structure on downstream side of Kuykendahl Rd. between Flintridge Dr. and Carlton Woods Creekside Dr. Assumed to be the same as upstream side.

OBJECTID: 128229_a	View of channel upstream side of Gosling Rd. between Flintridge Dr. and Creekside Forest Dr.



OBJECTID: 128229_b	Face of bridge on upstream side of Gosling Rd. between Flintridge Dr. and Creekside Forest Dr. Highly vegetated overbanks.

OBJECTID: 128229_c	Face of bridge on upstream side of Gosling Rd. between Flintridge Dr. and Creekside Forest Dr. Highly vegetated overbanks.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128229_d	Face of bridge on uptream side of Gosling Rd. between Flintridge Dr. and Creekside Forest Dr.

OBJECTID: 128230_a	View of channel upstream side of Gosling Rd. between Flintridge Dr. and Creekside Forest Dr. Light sedimentation. Vegetation growing into channel.

OBJECTID: 128230_b	Face of bridge on downstream side of Gosling Rd. between Flintridge Dr. and Creekside Forest Dr. Highly vegetated overbanks.

OBJECTID: 128230_c	Face of bridge on downstream side of Gosling Rd. between Flintridge Dr. and Creekside Forest Dr. Highly vegetated overbanks.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128230_d	Face of bridge on downstream side of Gosling Rd. between Flintridge Dr. and Creekside Forest Dr. Highly vegetated overbanks.

OBJECTID: 128230_e	Underside of bridge onGosling Rd. between Flintridge Dr. and Creekside Forest Dr. Highly vegetated overbanks.

OBJECTID: 128231_a	Face of bridge on upstream side of I-45 between Pruitt Rd. and Springwoods Village Pkwy.

OBJECTID: 128231_b	View of channel on upstream side of I-45 between Pruitt Rd. and Springwoods Village Pkwy.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128231_c	Heavy erosion on upstream side of I-45 between Pruitt Rd. and Springwoods Village Pkwy.	OBJECTID: 128231_d	View of channel looking upstream from underneath I-45 between Pruitt Rd. and Springwoods Village Pkwy.

OBJECTID: 128232_a	Heavy erosion from underside of I-45 between Pruitt Rd. and Springwoods Village Pkwy.	OBJECTID: 128232_b	Evident sedimentation on abutment slopes of bridge I-45 between Pruitt Rd. and Springwoods Village Pkwy.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128232_c	Evident sedimentation and erosion on abutment slopes of bridge I-45 between Pruitt Rd. and Springwoods Village Pkwy.

OBJECTID: 128232_d	Evident sedimentation on abutment slopes of bridge I-45 between Pruitt Rd. and Springwoods Village Pkwy.

OBJECTID: 128232_e	Evident sedimentation and erosion on abutment slopes of bridge I-45 between Pruitt Rd. and Springwoods Village Pkwy.

OBJECTID: 128232_f	Evident erosion on abutment slopes of bridge I-45 between Pruitt Rd. and Springwoods Village Pkwy. Originate from sidewalk drainage outfalls.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128232_g	View of channel on downstream side of I-45 between Pruitt Rd. and Springwoods Village Pkwy.

OBJECTID: 128232_h	Face of bridge on upstream side of I-45 between Pruitt Rd. and Springwoods Village Pkwy.

OBJECTID: 128613_a	Downstream face of railroad bridge. Bridge is located downstream of I-45.

OBJECTID: 128613_b	View of channel on downstream railroad bridge.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128614_a	Outfall structure downstream of railroad bridge.

OBJECTID: 128614_b	Slope down from outfall structure.

OBJECTID: 128614_c	Outfall structure downstream of railroad bridge. Estimated to be 6' x 5'.

OBJECTID: 128619_a	Debris caught on piers on the upstream side of SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128619_b	View of channel upstream of SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

OBJECTID: 128619_c	Face of bridge on upstream side SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

OBJECTID: 128621_a	Erosion by piers on upstream end of SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

OBJECTID: 128621_b	Erosion by piers on underneath SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128621_c	Erosion underneath SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

OBJECTID: 128620_a	View of channel downstream of SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd. Heavy erosion on banks.

OBJECTID: 128620_b	View of channel downstream of SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd. Heavy erosion on banks.

OBJECTID: 128620_c	Face of bridge on downstream side SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128620_d	Sedimentation under bridge on downstream side SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

OBJECTID: 128615_a	Face of bridge on downstream side SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

OBJECTID: 128615_b	Sedimentation downstream of SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

OBJECTID: 128616_a	Face of bridge on downstream side SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128616_b	View of channel downstream of SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd. Heavy erosion on banks.

OBJECTID: 128616_c	Erosion on banks downstream of SH-99 between Hardy Toll Rd. and Riley Fuzzell Rd. Heavy erosion on banks.

OBJECTID: 128618_a	View of channel upstream of Riley Fuzzell Rd. between Hardy Toll Rd. and SH-99. Moderate sedimentation on banks.

OBJECTID: 128618_b	Face of bridge on upstream side of Riley Fuzzell Rd. between Hardy Toll Rd. and SH-99.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 128617_a	View of channel downstream of Riley Fuzzell Rd. between Hardy Toll Rd. and SH-99.

OBJECTID: 128617_b	Face of bridge on downstream side of Riley Fuzzell Rd. between Hardy Toll Rd. and SH-99.

OBJECTID: 128617_c	Sedimentation under bridge of Riley Fuzzell Rd. between Hardy Toll Rd. and SH-99.

OBJECTID: 130620_a	Detention pond off channel between I-45 and SH-99. Upstream of pump station.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 130620_b	Pump station. Off channel between I-45 and SH-99. Upstream of pump station.	OBJECTID: 130619_a	Pump station. Off channel between I-45 and SH-99. Downstream of pump station.

OBJECTID: 130619_b	Pump station spillway. Off channel between I-45 and SH-99. Downstream of pump station.	OBJECTID: 131422_a	Pump station spillway. Off channel between I-45 and SH-99. Downstream of pump station. Upstream face of culvert 10'x5'. 3 barrels.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131422_b	Pump station spillway. Off channel between I-45 and SH-99. Downstream of pump station. Downstream face of culvert 10'x5'. 3 barrels.

OBJECTID: 131420_a	Downstream face of pedestrian bridge. Off channel between I-45 and SH-99. Downstream of pump station.

OBJECTID: 131420_b	View downstream of pedestrian bridge on outfall channel from detention pond. Off channel between I-45 and SH-99. Downstream of pump station.

OBJECTID: 131420_c	View upstream of pedestrian bridge on outfall channel from detention pond. Off channel between I-45 and SH-99. Downstream of pump station.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131420_d	View downstream of pedestrian bridge on outfall channel from detention pond. Off channel between I-45 and SH-99. Downstream of pump station.

OBJECTID: 131420_f	View upstream of pedestrian bridge on outfall channel from detention pond. Off channel between I-45 and SH-99. Downstream of pump station.

OBJECTID: 131419_a	Outfall of channel from detention pond into Spring Creek between I-45 and SH-99. Facing upstream.

OBJECTID: 131419_b	Outfall of channel from detention pond into Spring Creek between I-45 and SH-99. Facing downstream.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131418_a	Levee between along Spring Creek between I-45 and SH-99. Near detention pond facing south.	OBJECTID: 131418_b	Levee between along Spring Creek between I-45 and SH-99. Near detention pond facing north.

OBJECTID: 131424_a	Levee between along Spring Creek between I-45 and SH-99. About midway facing east.	OBJECTID: 131424_b	Levee between along Spring Creek between I-45 and SH-99. About midway facing west.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 131425_a	Levee between along Spring Creek between I-45 and SH-99. Near I-45 facing east.	OBJECTID: 131425_b	Levee between along Spring Creek between I-45 and SH-99. Near I-45 facing west.

OBJECTID: 130622_a	Levee between along Spring Creek between I-45 and SH-99. At I-45 facing east.	OBJECTID: 130622_b	Levee between along Spring Creek between I-45 and SH-99. At I-45 facing north. Looking toward toe of levee.

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Stream: Spring Creek (J100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 130622_c	Levee between along Spring Creek between I-45 and SH-99. At I-45 facing west.	OBJECTID:	

OBJECTID:		OBJECTID:	

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FIELD OBSERVATION REPORT

Project: San Jacinto Regional Watershed Master Drainage Plan **Report number: 1**

Client: Harris County Flood Control District Date: 5/3/2019

Subject: Field Reconnaissance – San Jacinto River (G103WFSJ) AVO: **33465**

WEATHER			SITE CONDITIONS		DAY	
☐ Clear	☐ Snow	☒ Warm	☐ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☒ Muddy		☐ Tuesday	☒ Friday
☒ Rain	☐ Cold	Temperature: 70-degrees			☐ Wednesday	

OBSERVATIONS:

As part of the Upper San Jacinto Regional Watershed Flood Mitigation project, a field reconnaissance effort was conducted for the West Fork of the San Jacinto River below the confluence of Lake Creek. The primary objective of the field visit is to document the crossing structures of West Fork San Jacinto. Only photographs were obtained from the visit as an effective model already exists for this stream. Photographs obtained from the field visit are presented in this report. A map showing their locations is included at the end of the document.

West Fork San Jacinto River is grass-lined natural channel that begins in Grimes County south of TX-30 between CR 228 and Grimes Rd. It then discharges into Lake Houston.

Access was usually limited to those areas immediately around the structures.

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Stream: San Jacinto River (G103WFSJ)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137830_a	View of channel upstream of bridge on I-45 between FM 1488 and South Loop 336 W. Heavy bank erosion.	OBJECTID: 137830_b	View of channel upstream of bridge on I-45 between FM 1488 and South Loop 336 W.

OBJECTID: 137830_c	View of channel beneath of the bridge on I-45 between FM 1488 and South Loop 336 W. From south bank looking northward.	OBJECTID: 137830_d	View of channel beneath of the bridge on I-45 between FM 1488 and South Loop 336 W. From south bank looking northward.

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Stream: San Jacinto River (G103WFSJ)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
137830_e	Face bridge on upstream side of I-45 between FM 1488 and South Loop 336 W.

OBJECTID:	
137042_a	Face bridge on downstream side of I-45 between FM 1488 and South Loop 336 W.

OBJECTID:	
137042_b	Face bridge on downstream side of I-45 between FM 1488 and South Loop 336 W.

OBJECTID:	
137042_c	View of channel upstream of bridge on I-45 between FM 1488 and South Loop 336 W.

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Stream: San Jacinto River (G103WFSJ)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137042_d	View of channel beneath of the bridge on I-45 between FM 1488 and South Loop 336 W. From south bank looking northward.	OBJECTID: 137042_e	View of channel beneath of the bridge on I-45 between FM 1488 and South Loop 336 W. From south bank looking northward.

OBJECTID: 137043_a	Face of railroad bridge upstream of I-45 between FM 1488 and South Loop 336 W.	OBJECTID: 137043_b	View of channel upstream of railroad bridge downstream of I-45 between FM 1488 and South Loop 336 W.

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Stream: San Jacinto River (G103WFSJ)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137043_c	Face of railroad bridge downstream of I-45 between FM 1488 and South Loop 336 W.	OBJECTID: 137043_d	View of channel downstream of railroad bridge downstream of I-45 between FM 1488 and South Loop 336 W.

OBJECTID: 137831_a	View of channel beneath bridge on TX-242 between Needham Rd. and Stonecrest Dr.	OBJECTID: 137831_b	Face bridge on upstream side of TX-242 between Needham Rd. and Stonecrest Dr.

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Stream: San Jacinto River (G103WFSJ)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
137831_c	View of channel upstream of TX-242 between Needham Rd. and Stonecrest Dr.

OBJECTID:	
137435_a	Face bridge on downstream side of TX-242 between Needham Rd. and Stonecrest Dr.

OBJECTID:	
137435_b	View of channel downstream of TX-242 between Needham Rd. and Stonecrest Dr.

OBJECTID:	
137832_a	View of channel upstream of SH99 between FM 1314 and Brinham Woods Dr.

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Stream: San Jacinto River (G103WFSJ)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
137832_b	View of channel beneath SH99 between FM 1314 and Brinham Woods Dr.

OBJECTID:	
137832_c	Face bridge on upstream side of TX-242 between Needham Rd. and Stonecrest Dr.

OBJECTID:	
137832_d	View of channel upstream of SH99 between FM 1314 and Brinham Woods Dr.

OBJECTID:	
137832_e	View of channel upstream of SH99 between FM 1314 and Brinham Woods Dr.

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Stream: San Jacinto River (G103WFSJ)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137044_a	Face bridge on downstream side of TX-242 between Needham Rd. and Stonecrest Dr.	OBJECTID: 137044_b	View of channel downstream of SH99 between FM 1314 and Brinham Woods Dr.

OBJECTID: 137044_c	View of overbanks and underside of SH99 between FM 1314 and Brinham Woods Dr. Looking southwest.	OBJECTID:	

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FIELD OBSERVATION REPORT

Project: San Jacinto Regional Watershed Master Drainage Plan **Report number: 1**

Client: Harris County Flood Control District Date: 4/30/2019

Subject: Field Reconnaissance – San Jacinto River (G103) AVO: **33465**

WEATHER		SITE CONDITIONS		DAY	
☒ Clear	☐ Snow	☒ Warm	☒ Clear	☐ Dusty	☐ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy		☒ Tuesday	☐ Friday
☐ Rain	☐ Cold	Temperature: 70-degrees			☐ Wednesday	

OBSERVATIONS:

As part of the San Jacinto River Study project, a field reconnaissance effort was conducted for G103, San Jacinto River. The primary objective of the field visit is to document the crossing structures of the San Jacinto River. Photographs obtained from the field visit are presented in this report. A map showing their locations is included at the end of the document.

The northern portion of the West Fork of San Jacinto River begins in Walker County. The San Jacinto River is grass-lined natural channel. Access was usually limited to those areas immediately around the structures.

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Stream: San Jacinto River (G103)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 138632_a	View of downstream face of railroad bridge upstream of Beaumont Hwy.

OBJECTID: 138632_b	View of downstream face of railroad bridge upstream of Beaumont Hwy.

OBJECTID: 138632_c	View of downstream face of railroad bridge upstream of Beaumont Hwy.

OBJECTID: 138632_d	View of channel downstream of railroad bridge upstream of Beaumont Hwy. Evident erosion on banks.

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Stream: San Jacinto River (G103)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 138632_e	View of channel downstream of railroad bridge upstream of Beaumont Hwy. Evident erosion on banks.	OBJECTID: 138232_a	View of upstream face of bridge on Beaumont Hwy.

OBJECTID: 138232_b	View of channel upstream of bridge on Beaumont Hwy. Evident bank erosion.	OBJECTID: 138234_a	View of downstream face of Beaumont Hwy. between FM 2100 and Sheldon Rd.

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Stream: San Jacinto River (G103)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 138234_b	View of downstream face of Beaumont Hwy. between FM 2100 and Sheldon Rd.	OBJECTID: 138234_c	View of channel downstream of bridge on Beaumont Hwy.

OBJECTID: 138633_a	View of upstream face of TX-90 between FM 2100 and Sheldon Rd.	OBJECTID: 138633_b	View of underside of TX-90 between FM 2100 and Sheldon Rd.

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Stream: San Jacinto River (G103)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 138633_c	View of channel downstream of TX-90 between FM 2100 and Sheldon Rd.	OBJECTID: 138633_d	View of downstream face of TX-90 between FM 2100 and Sheldon Rd.

OBJECTID: 138235_a	View of downstream face of railroad bridge upstream of SH-10.	OBJECTID: 138235_b	View of downstream face of railroad bridge upstream of SH-10.

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Stream: San Jacinto River (G103)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 138235_c	View of downstream face of railroad bridge upstream of SH-10.	OBJECTID: 138235_d	View of downstream face of railroad bridge upstream of SH-10.

OBJECTID: 138235_e	View of downstream face of railroad bridge upstream of SH-10.	OBJECTID: 138235_f	View of downstream face of railroad bridge upstream of SH-10.

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FIELD OBSERVATION REPORT

Project: San Jacinto Regional Watershed Master Drainage Plan

Report number: 1

Client: Harris County Flood Control District

Date: 5/2/2019

Subject: Field Reconnaissance – Lake Creek (GLC)

AVO: **33465**

WEATHER

- ☒ Clear
- ☐ Overcast
- ☐ Rain
- ☐ Snow
- ☐ Foggy
- ☐ Cold
- ☒ Warm
- ☐ Hot

Temperature: 70-degrees

SITE CONDITIONS

- ☒ Clear
- ☐ Muddy
- ☐ Dusty

DAY

- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☒ Thursday
- ☐ Friday

OBSERVATIONS:

As part of the Upper San Jacinto Regional Watershed Flood Mitigation project, a field reconnaissance effort was conducted for Lake Creek. The primary objective of the field visit is to document the crossing structures of Lake Creek. Sketches and photographs were obtained for the site visit. Sketches are only for structures upstream of TX-105. Photographs obtained from the field visit are presented in this report. A map showing their locations is included at the end of the document.

Lake Creek is grass-lined natural channel that begins in Grimes county west of County Road 240. It then discharges into the West Fork San Jacinto River upstream of I-45.

Access was usually limited to those areas immediately around the structures. A number of structures were located on private property and were not able to be surveyed.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137030_a	Face of 5' diameter, 4 barrel culvert on upstream side of CR 240 between TX-30 and CR 239.	OBJECTID: 137030_b	Face of 5' diameter, 4 barrel culvert on upstream side of CR 240 between TX-30 and CR 239.

OBJECTID: 137030_c	View of channel upstream of culvert on CR 240 between TX-30 and CR 239. Moderate bank vegetation.	OBJECTID: 137031_a	Face of 5' diameter, 4 barrel culvert on downstream side of CR 240 between TX-30 and CR 239.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137031_b	View of channel downstream of culvert on CR 240 between TX-30 and CR 239. Moderate to heavy bank vegetation.	OBJECTID: 137032_a	Face of bridge on upstream side of TX-30 between CR 233 and FM 2620.

OBJECTID: 137032_b	View of channel upstream of bridge on TX-30 between CR 233 and FM 2620. Moderate bank vegetation.	OBJECTID: 137430_a	Face of bridge on downstream side of TX-30 between CR 233 and FM 2620.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
137430_b	View of channel downstream of bridge on TX-30 between CR 233 and FM 2620. Moderate bank vegetation.

OBJECTID:	
137033_a	View of channel upstream of bridge on CR 233 between TX-30 and CR 231. Moderate bank vegetation.

OBJECTID:	
137033_b	Face of bridge on upstream side of CR 233 between TX-30 and CR 231.

OBJECTID:	
137034_a	Face of bridge on downstream side of CR 233 between TX-30 and CR 231.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
137034_b	View of channel downstream of bridge on CR 233 between TX-30 and CR 231. Moderate bank vegetation.

OBJECTID:	
137035_a	Face of bridge on upstream side of FM 149 between CR 216 and Lynn St.

OBJECTID:	
137035_b	View of channel upstream of bridge FM 149 between CR 216 and Lynn St. Heavy ponding.

OBJECTID:	
137035_c	View of roadside drainage ditch upstream of bridge FM 149 between CR 216 and Lynn St. Heavy ponding.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
137035_d	View of channel upstream of bridge FM 149 between CR 216 and Lynn St. Heavy ponding.

OBJECTID:	
137035_e	View of roadside drainage ditch upstream of bridge FM 149 between CR 216 and Lynn St. Heavy ponding.

OBJECTID:	
137035_f	Face of bridge on upstream side of FM 149 between CR 216 and Lynn St.

OBJECTID:	
137036_a	Face of bridge on downstream side of FM 149 between CR 216 and Lynn St.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
137036_b	View of channel downstream of bridge FM 149 between CR 216 and Lynn St. Heavy ponding.

OBJECTID:	
137036_c	View of roadside ditch downstream of bridge FM 149 between CR 216 and Lynn St. Heavy ponding.

OBJECTID:	
137036_d	Face of bridge on downstream side of FM 149 between CR 216 and Lynn St.

OBJECTID:	
137037_a	View of channel upstream of bridge Johnson Rd. between FM1486 and Bethel Rd.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137037_b	Face of bridge on upstream side of Johnson Rd. between FM1486 and Bethel Rd.

OBJECTID: 137431_a	Face of bridge on downstream side of Johnson Rd. between FM1486 and Bethel Rd.

OBJECTID: 137431_b	View of channel downstream of bridge Johnson Rd. between FM1486 and Bethel Rd.

OBJECTID: 137038_a	Face of bridge on downstream side of TX-105 between FM1486 and Pooles Rd.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137038_b	View of channel downstream of bridge TX-105 between FM1486 and Pooles Rd.

OBJECTID: 137038_c	View of channel beneath of bridge TX-105 between FM1486 and Pooles Rd.

OBJECTID: 137436_a	View of channel upstream of bridge TX-105 between FM1486 and Pooles Rd.

OBJECTID: 137436_b	Face of bridge on upstream side of TX-105 between FM1486 and Pooles Rd.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137436_c	Face of bridge on upstream side of TX-105 between FM1486 and Pooles Rd.

OBJECTID: 137432_a	View of channel upstream of railroad bridge, upstream of Old Dobbin Rd.

OBJECTID: 137432_b	Face of bridge on upstream side of railroad bridge, upstream of Old Dobbin Rd.

OBJECTID: 137039_a	Face of bridge on downstream side of railroad bridge, upstream of Old Dobbin Rd.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137039_b	View of channel upstream of railroad bridge, downstream of Old Dobbin Rd.

OBJECTID: 137039_c	View of channel upstream of railroad bridge, downstream of Old Dobbin Rd.

OBJECTID: 137829_a	Face of bridge on upstream side of Old Dobbin Rd. between Dobbin Rd. and St. Beulah Chapel Rd.

OBJECTID: 137829_b	View of channel upstream of railroad bridge, downstream of Old Dobbin Rd. between Dobbin Rd. and St. Beulah Chapel Rd.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137433_a	Face of bridge on downstream side of Old Dobbin Rd. between Dobbin Rd. and St. Beulah Chapel Rd.	OBJECTID: 137433_b	View of channel downstream of Old Dobbin Rd. between Dobbin Rd. and St. Beulah Chapel Rd.

OBJECTID: 137437_a	View of channel downstream of FM 149 between Stillwater Ct. and Mitchell Rd.	OBJECTID: 137437_b	Face of bridge on downstream side of FM 149 between Stillwater Ct. and Mitchell Rd.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137040_a	Face of bridge on upstream side of FM 149 between Stillwater Ct. and Mitchell Rd.

OBJECTID: 137040_b	View of channel upstream of FM 149 between Stillwater Ct. and Mitchell Rd.

OBJECTID: 137040_c	View of channel beneath FM 149 between Stillwater Ct. and Mitchell Rd. Evident sedimentation and erosion.

OBJECTID: 137041_a	View of channel upstream of Superior Rd between Corporate Wood Dr. and Pal Metta Ln.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
137434_a	Face of bridge on upstream side of Honea Egypt Rd. between S Trace Dr. and Mulligan Dr.

OBJECTID:	
137434_b	View of channel upstream of Honea Egypt Rd. between S Trace Dr. and Mulligan Dr.

OBJECTID:	
137434_c	View of channel beneath Honea Egypt Rd. between S Trace Dr. and Mulligan Dr.

OBJECTID:	
137438_a	Face of bridge on downstream side of Honea Egypt Rd. between S Trace Dr. and Mulligan Dr.

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Stream: Lake Creek (GLC)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 137438_b	View of channel downstream of Honea Egypt Rd. between S Trace Dr. and Mulligan Dr.	OBJECTID:	

OBJECTID:		OBJECTID:	

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FIELD OBSERVATION REPORT

Project: San Jacinto Regional Watershed Master Drainage Plan

Report number: 1

Client: Harris County Flood Control District

Date: 4/30/2019

Subject: Field Reconnaissance – Jackson Bayou (R100-00-00)

AVO: **33465**

WEATHER

- ☒ Clear
- ☐ Overcast
- ☐ Rain
- ☐ Snow
- ☐ Foggy
- ☐ Cold
- ☒ Warm
- ☐ Hot

Temperature: 70-degrees

SITE CONDITIONS

- ☒ Clear
- ☐ Muddy
- ☐ Dusty

DAY

- ☐ Monday
- ☒ Tuesday
- ☐ Wednesday
- ☐ Thursday
- ☐ Friday

OBSERVATIONS:

As part of the Upper San Jacinto Regional Watershed Flood Mitigation project, a field reconnaissance effort was conducted for R100-00-00 and R102-00-00, Jackson Bayou and Gum Gully. The primary objective of the field visit is to document the crossing structures of Jackson Bayou and Gum Gully. Gum Gully is a tributary of R100-00-00, Jackson Bayou. Photographs obtained from the field visit are presented in this report. A map showing their locations is included at the end of the document.

Jackson Bayou is in the northeastern portion of Harris County. Jackson Bayou and Gum Gully are grass-lined natural channels. Access was usually limited to those areas immediately around the structures.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
136216_a	View of channel upstream of bridge on E Stroker Rd. between Crosby Huffman Rd. and Miller Wilson Rd.

OBJECTID:	
136216_b	View of upstream face of bridge on E Stroker Rd. between Crosby Huffman Rd. and Miller Wilson Rd.

OBJECTID:	
136216_c	View of underside of bridge on E Stroker Rd. between Crosby Huffman Rd. and Miller Wilson Rd. Erosion evident at bridge abutments.

OBJECTID:	
136217_a	View of channel downstream of bridge on E Stroker Rd. between Crosby Huffman Rd. and Miller Wilson Rd.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
136217_b	View of downstream face of bridge on E Stroker Rd. between Crosby Huffman Rd. and Miller Wilson Rd.

OBJECTID:	
136218_a	View of upstream face of culvert on south side of E Stroker Rd. between Crosby Huffman Rd. and Miller Wilson Rd. 7' diameter non corrugated metal pipe.

OBJECTID:	
136218_b	View of channel upstream of culvert on south side of E Stroker Rd. between Crosby Huffman Rd. and Miller Wilson Rd.

OBJECTID:	
136219_a	View of downstream face of culvert on south side of E Stroker Rd. between Crosby Huffman Rd. and Miller Wilson Rd. 7' diameter non corrugated metal pipe.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
136219_b	View of channel downstream of culvert on south side of E Stroker Rd. between Crosby Huffman Rd. and Miller Wilson Rd.

OBJECTID:	
135814_a	View of upstream face of bridge on Crosby Huffman Rd. between Gum Gully Rd and Reidland Rd.

OBJECTID:	
135814_b	View of channel upstream of bridge on Crosby Huffman Rd. between Gum Gully Rd and Reidland Rd.

OBJECTID:	
135814_c	View of underside of bridge on Crosby Huffman Rd. between Gum Gully Rd and Reidland Rd. Evident erosion and uneven settling of abutments.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 135815_a	Roadside drainage structure on downstream side of Crosby Huffman Rd. between Gum Gully Rd and Reidland Rd.

OBJECTID: 135815_b	Roadside drainage structure on downstream side of Crosby Huffman Rd. between Gum Gully Rd and Reidland Rd.

OBJECTID: 135815_c	View of downstream face of bridge on Crosby Huffman Rd. between Gum Gully Rd and Reidland Rd.

OBJECTID: 135815_d	View of channel downstream of bridge on Crosby Huffman Rd. between Gum Gully Rd and Reidland Rd. Light channel vegetation and sedimentation.

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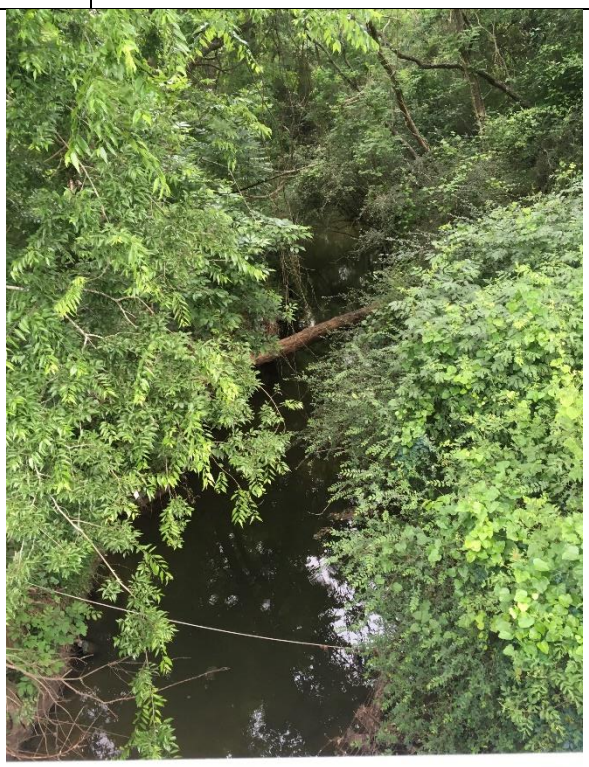
Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	Description
135815_e	View of channel downstream of bridge on Crosby Huffman Rd. between Gum Gully Rd and Reidland Rd. Light channel vegetation and sedimentation.

OBJECTID:	Description
135816_a	View of channel upstream of bridge on Foley Rd. between Crosby Huffman Rd. and Kubin Rd.



OBJECTID:	Description
135816_b	View of underside of bridge on Foley Rd. between Crosby Huffman Rd. and Kubin Rd. Evident erosion along banks.

OBJECTID:	Description
135816_c	View of channel upstream of bridge on Foley Rd. between Crosby Huffman Rd. and Kubin Rd.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 136222_a	View of channel downstream of bridge on Foley Rd. between Crosby Huffman Rd. and Kubin Rd.

OBJECTID: 136222_b	View of channel downstream of bridge on Foley Rd. between Crosby Huffman Rd. and Kubin Rd.

OBJECTID: 136222_c	View of downstream face of bridge on Foley Rd. between Crosby Huffman Rd. and Kubin Rd.

OBJECTID: 136224_a	View of upstream face of bridge on N Diamondhead Blvd. between Port O Call St. and Yacht Ct.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 136224_b	View of channel upstream of bridge on N Diamondhead Blvd. between Port O Call St. and Yacht Ct.

OBJECTID: 136224_c	View of upstream face of bridge on N Diamondhead Blvd. between Port O Call St. and Yacht Ct.

OBJECTID: 136224_d	View of channel upstream of bridge on N Diamondhead Blvd. between Port O Call St. and Yacht Ct. Substantial channel debris.

OBJECTID: 136224_e	View of upstream face of bridge on N Diamondhead Blvd. between Port O Call St. and Yacht Ct.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 136224_f	View of underside of bridge on N Diamondhead Blvd. between Port O Call St. and Yacht Ct. Evident erosion along banks.

OBJECTID: 136223_a	View of channel downstream of bridge on N Diamondhead Blvd. between Port O Call St. and Yacht Ct.

OBJECTID: 136223_b	View of channel downstream of bridge on N Diamondhead Blvd. between Port O Call St. and Yacht Ct.

OBJECTID: 136223_c	View of downstream face of bridge on N Diamondhead Blvd. between Port O Call St. and Yacht Ct.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 136226_a	View of channel upstream of culvert on Liberty Way Ct. between Boat Hook St and Yeoman Way.	OBJECTID: 136226_b	View of upstream face of culvert on Liberty Way Ct. between Boat Hook St and Yeoman Way. Culvert is 3.5'W x 5'H with 3 barrels.

OBJECTID: 136226_c	View of channel upstream of culvert on Liberty Way Ct. between Boat Hook St and Yeoman Way.	OBJECTID: 136225_a	View of channel down of culvert on Liberty Way Ct. between Boat Hook St and Yeoman Way.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
136225_b	View of downstream face of culvert on Liberty Way Ct. between Boat Hook St and Yeoman Way. Culvert is 3.5'W x 5'H with 3 barrels.

OBJECTID:	
136228_a	View of channel upstream of culvert on Flying Bridge Way between Broken Back Dr. and Yeoman Way.

OBJECTID:	
136228_b	View of channel upstream of culvert on Flying Bridge Way between Broken Back Dr. and Yeoman Way.

OBJECTID:	
136228_c	View of upstream face of culvert on Flying Bridge Way between Broken Back Dr. and Yeoman Way. Culvert is 2.5'W x 5'H with 3 barrels.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
136227_a	View of channel downstream of culvert on Flying Bridge Way between Broken Back Dr. and Yeoman Way.

OBJECTID:	
136227_b	View of downstream face of culvert on Flying Bridge Way between Broken Back Dr. and Yeoman Way. Culvert is 2.5'W x 5'H with 3 barrels.

OBJECTID:	
136227_c	View of channel banks downstream of culvert on Flying Bridge Way between Broken Back Dr. and Yeoman Way. Significant erosion.

OBJECTID:	
136227_d	View of channel banks downstream of culvert on Flying Bridge Way between Broken Back Dr. and Yeoman Way. Significant erosion.

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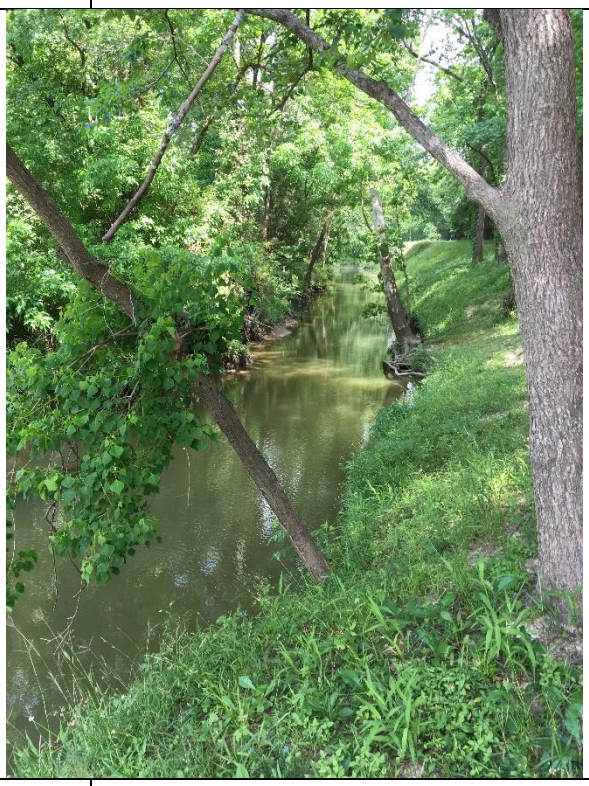
Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 138629_a	View of channel upstream of culvert southwest of Backstay Ct. and east of Golf Club Dr.

OBJECTID: 138629_b	View of channel upstream of culvert southwest of Backstay Ct. and east of Golf Club Dr.



OBJECTID: 138629_c	View of upstream face of culvert southwest of Backstay Ct. and east of Golf Club Dr. Culvert is 6'W x 5'H with 2 barrels.

OBJECTID: 138229_a	View of channel downstream of culvert southwest of Backstay Ct. and east of Golf Club Dr.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 138229_b	View of downstream face of culvert southwest of Backstay Ct. and east of Golf Club Dr. Culvert is 6'W x 5'H with 2 barrels.

OBJECTID: 138630_a	View of channel upstream of culvert on Stem Way Dr. between W Kingscoate Dr. and Taffrail Way. Evident erosion on bank.

OBJECTID: 138630_b	View of upstream face of culvert southwest of Backstay Ct. and east of Golf Club Dr. Culvert is 4'W x 6'H with 3 barrels.

OBJECTID: 138230_a	View of channel downstream of culvert on Stem Way Dr. between W Kingscoate Dr. and Taffrail Way.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID:	
138230_b	View of downstream face of culvert southwest of Backstay Ct. and east of Golf Club Dr. Culvert is 4'W x 6'H with 3 barrels.

OBJECTID:	
138230_c	View of channel downstream of culvert on Stem Way Dr. between W Kingscoate Dr. and Taffrail Way. Evident erosion on banks.

OBJECTID:	
138631_a	View of channel upstream of bridge on S Diamondhead Blvd between Golf Club Dr. and Afore Dr.

OBJECTID:	
138631_b	View of channel upstream of bridge on S Diamondhead Blvd between Golf Club Dr. and Afore Dr. Evident bank erosion.

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Stream: Jackson Bayou (R100-00-00)	**Field Grid: N/A**	**HMS Subbasin:**

OBJECTID: 138631_c	View of upstream face of bridge on S Diamondhead Blvd between Golf Club Dr. and Afore Dr.

OBJECTID: 138631_d	View of channel upstream of bridge on S Diamondhead Blvd between Golf Club Dr. and Afore Dr. Evident bank erosion.

OBJECTID: 138231_a	View of channel downstream of bridge on S Diamondhead Blvd between Golf Club Dr. and Afore Dr. Evident bank erosion.

OBJECTID: 138231_b	View of downstream face of bridge on S Diamondhead Blvd between Golf Club Dr. and Afore Dr.

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FIELD OBSERVATION REPORT

Project: San Jacinto River Watershed Master Drainage Plan Study **Report number: 1**

Client: Harris County Flood Control District Date: 04/29/2019

Subject: Field Reconnaissance – STB AVO:

WEATHER			SITE CONDITIONS		DAY	
☒ Clear	☐ Snow	☒ Warm	☒ Clear	☐ Dusty	☒ Monday	☐ Thursday
☐ Overcast	☐ Foggy	☐ Hot	☐ Muddy		☐ Tuesday	☐ Friday
☐ Rain	☐ Cold	Temperature: 85-degrees			☐ Wednesday	

OBSERVATIONS:

As part of the San Jacinto River Watershed Master Drainage Plan Study, a field reconnaissance effort was conducted for STB (Tarkington Bayou). The effort consisted of locating, photographing, and recording the crossing type of various crossings along Tarkington Bayou. The photographs and field notes taken are presented in this report.

STB is located on the east side of the San Jacinto watershed and discharges into Luce Bayou at the downstream end of the watershed. The channel starts at Big Creek Scenic Road just east of FM 2025 in Coldspring, Texas and discharges into Luce Bayou. Access was mostly limited to road crossings.

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Stream: STB		**Field Grid:** T-2	**HMS Subbasin:**
OBJECTID: 386	Upstream of the crossing at FM 1960.	OBJECTID: 390	Downstream face of culvert
			
OBJECTID: 385	Channel looking upstream of culvert	OBJECTID: 389	Channel looking downstream of culvert
			

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Stream: STB		**Field Grid:** T-3	**HMS Subbasin:**
OBJECTID: 392	Upstream of crossing.	OBJECTID: 393	Downstream of crossing.
			
OBJECTID: 394	Water crossing.	OBJECTID: 395	Area around crossing
			

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Stream: STB		**Field Grid:** T-4	**HMS Subbasin:**
OBJECTID: 399	Upstream face of County Rd. 331 bridge.	OBJECTID: 400	Downstream face of County Rd. 331 bridge.
			
OBJECTID: 401	Channel upstream of County Rd. 331 bridge.	OBJECTID: 402	Channel downstream of the County Rd. 331 bridge
			

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Stream: STB		**Field Grid:** T-5	**HMS Subbasin:**
OBJECTID: 404	Upstream face of FM 321 bridge.	OBJECTID: 406	Upstream face of FM 321 bridge.
			
OBJECTID: 408	Downstream face of FM 321 bridge.	OBJECTID: 407	Quality of FM 321 bridge.
			

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Stream: STB	**Field Grid:** T-7	**HMS Subbasin:**

OBJECTID: 411	Upstream face of FM 787 bridge.	OBJECTID: 412	Underside of FM 787 bridge.

OBJECTID: 409	Upstream of FM 787 bridge.	OBJECTID: 413	Downstream of FM 787 bridge.

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Stream: STB		**Field Grid:** T-11	**HMS Subbasin:**
OBJECTID: 313	Upstream face of railroad bridge	OBJECTID: 310	Underneath railroad bridge
			
OBJECTID: 314	Downstream face of railroad bridge.	OBJECTID: 316	Downstream of railroad bridge.
			

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Stream: STB	**Field Grid:** T-12	**HMS Subbasin:** Q112C

OBJECTID: 317	Downstream face of Highway 59 bridge.	OBJECTID: 318	Underneath Highway 59 bridge.

OBJECTID: 319	Looking downstream from Highway 59 bridge.	OBJECTID: 320	Looking upstream from Highway 59 bridge.

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Stream: STB	**Field Grid:** T-13	**HMS Subbasin:**

OBJECTID: 324	Upstream face of Highway 59 bridge.	OBJECTID: 328	Underneath Highway 59 bridge.

OBJECTID: 326	Channel looking upstream of Highway 59 bridge.	OBJECTID: 325	Channel looking downstream of Highway 59 bridge.

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Stream: STB	**Field Grid:** T-14	**HMS Subbasin:**

OBJECTID: 335	Upstream face of Little John St. culvert.	OBJECTID: 333	Downstream face of Little John St. culvert.

OBJECTID: 334	Channel looking upstream from Little John St. culvert.	OBJECTID: 331	Channel looking downstream from Little John St. culvert.

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Stream: STB		**Field Grid:** T-16	**HMS Subbasin:**
OBJECTID: 338	Upstream face of Sherwood Dr. culvert.	OBJECTID: 342	Downstream face of Sherwood Dr. culvert.
			
OBJECTID: 337	Channel looking upstream from Sherwood Dr. culvert.	OBJECTID: 340	Channel looking downstream from Sherwood Dr. culvert.
			

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Stream: STB	**Field Grid:** T-17	**HMS Subbasin:**

OBJECTID: 343	Road deck over Sherwood Dr. culvert	OBJECTID: 343	Downstream face of Sherwood Dr. culvert.

OBJECTID: 347	Channel looking upstream from Sherwood Dr. culvert.	OBJECTID: 331	Channel looking downstream from Sherwood Dr. culvert.

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Stream: STB	**Field Grid:** T-19	**HMS Subbasin:**

OBJECTID: 353	Upstream face of Forest Dr. culvert.	OBJECTID: 357	Downstream face of Forest Dr. culvert.

OBJECTID: 356	Channel looking upstream from Forest Dr. culvert.	OBJECTID: 355	Channel looking downstream from Forest Dr. culvert.

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Stream: STB	**Field Grid:** T-22	**HMS Subbasin:**

OBJECTID: 376	Upstream face of FM 2666 culvert.	OBJECTID: 373	Downstream face of FM 2666 culvert.

OBJECTID: 370	Area around FM 2666. culvert.	OBJECTID: 378	Channel looking downstream from FM 2666 culvert.

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Stream: STB	**Field Grid:** T-23	**HMS Subbasin:**

OBJECTID: 382	Upstream face of Forest Service Rd. 221 culvert.	OBJECTID: 333	Downstream face of Forest Service Rd. 221 culvert.

OBJECTID: 331	Channel looking downstream from Forest Service Rd. 221 culvert.