

City of Sugar Land
Proposal for
Drainage Assessments for Elkins Road (Between Commonwealth Blvd. and University Blvd.) and
Knightsbridge Blvd.

I. Overview

The City of Sugar Land (COSL) has experienced excessive rainfall events during three recent occasions. The Memorial Day 2015, Tax Day 2016, and Hurricane Harvey 2017 storm events brought excessive ponding, structural flooding, and exceeded design capacities throughout the region. These events have brought certain areas to the City's attention that are prone to severe ponding during heavy rainfall. Two such areas are shown in **Exhibit 1**. Area 1 is located in Levee Improvement District (LID) 14 and includes portions of Commonwealth Blvd, Elkins Rd, and University Blvd. Area 2 is located in First Colony LID 2 and includes Knightsbridge Blvd. These are locations where the COSL wishes to perform improvements to the storm drainage infrastructure with the goal of lessening ponding during a heavy rainfall event. Jones|Carter (JC) presents this proposal to the City of Sugar Land to analyze possible improvements in these areas. JC will analyze several alternatives for each area and present solutions that will, at minimum, meet the maximum allowable ponding standards set by the COSL Design Standards, and at maximum, qualify as evacuation routes for the City.

II. Resources and Data Requirements

- a. Fort Bend County Lidar data
- b. Fort Bend County Aerial imagery
- c. Fort Bend County Appraisal District (CAD) parcel data
- d. Available GIS database information on storm water infrastructure, drainage basins, floodplains, and other relevant data.
- e. Master Drainage Plan for the City of Sugar Land
- f. As-built or proposed plans for relevant existing storm drain systems and roadways important for the study.
- g. Survey data, if available.
- h. Fort Bend County Drainage Criteria Manual

III. Proposed Tasks

a. **Task 1:** Base Model Development

JC will build two models in Innovyze's ICM software; one for the areas contained within LID 14, and one for areas contained within First Colony LID 2. JC believes that it is necessary to build a model for each entire system in order to fully capture the severity of flooding in each area of concern. Each model will be 1D/2D and will model the overland flow in addition to the inlets, stormwater conduits, detention ponds, and other infrastructure owned by the CoSL and the LID . JC recommends to perform the analysis utilizing rain-on-grid technology. JC proposes to evaluate existing conditions system

performance for LID 14 and First Colony LID 2 in the 2-year, 10-year, 100-year, and 500-year storm events. JC will also attempt to validate the existing conditions models by running the Memorial Day 2015, Tax Day 2016, and 2017 Hurricane Harvey storm events.

b. **Task 2:** Alternative Analysis

Using the base model developed in Task 1, JC proposes to run two alternative analyses for each area of concern shown in **Exhibit 1**. The study will evaluate improvements to both inlet and storm sewers for the 2-year, 10-year, 100-year, and 500-year events. JC will also evaluate the system performance for each solution during the Memorial Day 2015, Tax Day 2016, and 2017 Hurricane Harvey storm events. For Area 1, the study will also evaluate the performance of the LID 14 detention pond operations. For each area of concern, JC will attempt to propose the following solutions. Should JC find that the one or both of the following solutions are not feasible, we will provide a recommendation for the best path forward.

Area 1

Solution 1:

- i. One passable lane during the 100-year event
- ii. Minimum 2-year event storm sewer capacity. *JC will not delineate drainage areas to develop 2-year flows for storm sewer capacity. Instead, JC will attempt to minimize street ponding during the 2-year event.*
- iii. JC will attempt to ensure that the LID 14 detention pond maintains a minimum 1-foot of freeboard between the top of bank and the 100-year water surface elevation with the proposed inlet and storm sewer improvements. Should improvements to the detention pond storage and/or operations be required, JC will make recommendations for these as well.

Solution 2:

- i. Two passable lanes during the 100-year event
- ii. Minimum 10-year event storm sewer capacity. *JC will not delineate drainage areas to develop 10-year flows for storm sewer capacity. Instead, JC will attempt to minimize street ponding during the 10-year event.*
- iii. JC will attempt to ensure that the LID 14 detention pond maintains a minimum 1-foot of freeboard between the top of bank and the 100-year water surface elevation with the proposed inlet and storm sewer improvements. Should improvements to the detention pond storage and/or operations be required, JC will make recommendations for these as well.

Area 2

Solution 1:

- i. One passable lane during the 100-year event
- ii. Minimum 2-year event storm sewer capacity. *JC will not delineate drainage areas to develop 2-year flows for storm sewer capacity. Instead, JC will attempt to minimize street ponding during the 2-year event.*

Solution 2:

- i. Two passable lanes during the 100-year event
- ii. Minimum 10-year event storm sewer capacity. *JC will not delineate drainage areas to develop 10-year flows for storm sewer capacity. Instead, JC will attempt to minimize street ponding during the 10-year event.*

c. **Task 3:** Construction Cost Estimates

JC will provide preliminary construction cost estimates for each solution. The cost estimates will be based on information obtained from the modeling exercise and will require further refinement during a future Preliminary Engineering Report.

d. **Task 4:** Evaluate Recommendations with Harvey Rainfall

JC proposes to run the Hurricane Harvey Rainfall with the recommended solutions for Area 1 and Area 2. JC will not target a design capacity to handle the Hurricane Harvey rainfall, but evaluating how the recommended solution would have performed during the event.

e. **Task 5:** Report and Recommendations

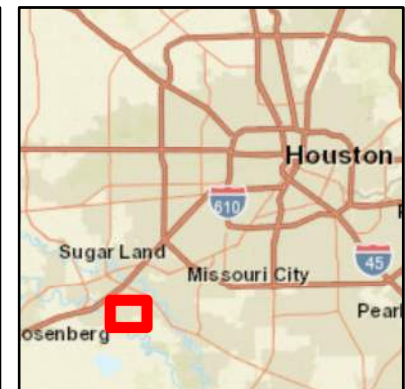
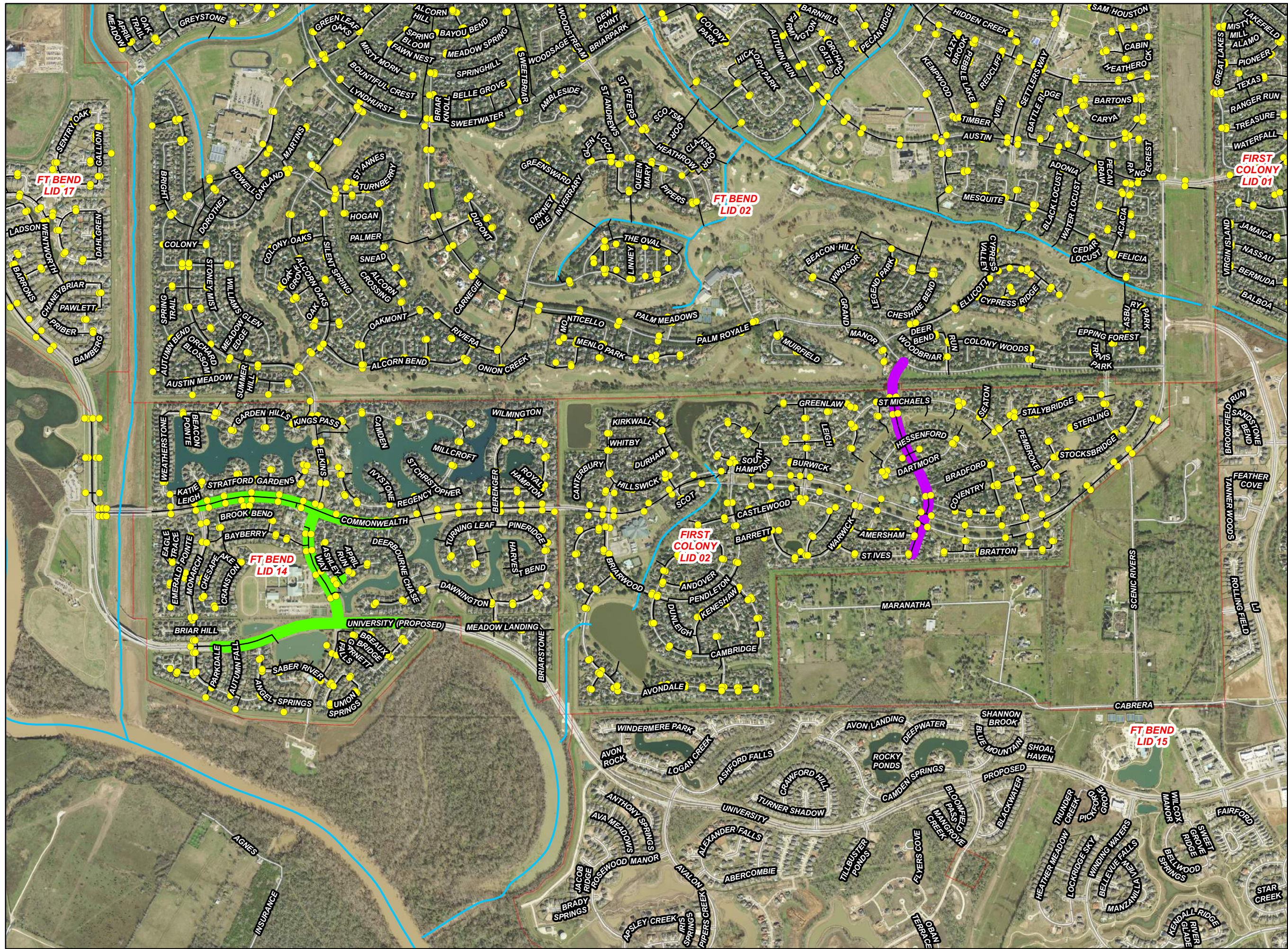
JC will compile a report summarizing all methodology, results, cost estimates, and recommendations. This report will include exhibits illustrating the proposed improvement layouts for each solution. JC will also provide the pre- and post-project floodplain maps for the 2-year, 10-year, 100-year, and 500-year statistical storm events, as well as the, Memorial Day 2015, Tax Day 2016, and 2017 Hurricane Harvey historical storm events.

IV. Proposed Fee

JC proposes to complete the tasks listed above for a lump sum fee of \$90,000. Please see the attached Project Fee Estimate for an outline of expected costs.

V. Deliverables

- a. JC proposes to first submit electronic copies of the report and relevant electronic files. Once the City has delivered final comments and all parties have come to an agreement on how those comments should be addressed, JC will submit three final hard copies of the report and a data CD that will include electronic copies the report, the hydraulic models, and any other relevant files and/or spread sheets.



VICINITY MAP
Scale: 1 inch equals 21 miles

- LEGEND**
- Inlets
 - Area 1
 - Area 2
 - Roads
 - Stream
 - Storm Sewer
 - LID Boundaries



**Post Hurricane Harvey
Drainage Study**

0 750 1,500
Feet

**City of Sugar Land
FORT BEND COUNTY, TEXAS**



**Exhibit 1:
Study Location Map**



1 inch equals 1,500 feet

Disclaimer:
This product is offered for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property, governmental and/or political boundaries or related facilities to said boundary. No express warranties are made by Jones & Carter, Inc. concerning the accuracy, completeness, reliability, or usability of the information included within this exhibit.

Coordinate System: NAD 83 TX S CENTRAL 4203 FEET
Vertical Datum: NAVD 1988 - 2001 Adjustment

		Jones & Carter, Inc.					Project Assistant	Work Item Total	Task Subtotal
Task	Description	Princ./Sr. PM	Sr. Engr	Proj Engr	Engineer II	GIS II			
0.0	Meetings and Coordination	6		6				\$2,130.00	\$2,130.00
1.0	Base Model Development (Run 2-year, 10-year, 100-year, and 500-year events)								\$27,590.00
	Import data from GIS	2	2	6	45	12		\$6,950.00	
	Set up models with statistical rainfall, 2D mesh, landuse, and boundary conditions. Debug.	2	2	8	80			\$9,450.00	
	Validate with 3 historical events			14	40			\$5,790.00	
	Quality Control	2	2	6	40			\$5,400.00	
2.0	Alternative Analysis (Run 2-year, 10-year, 100-year, and 500-year events)								\$28,500.00
	Solution 1 for Area 1	2	4	10	60			\$8,210.00	
	Solution 1 for Area 2	2	4	8	40			\$6,040.00	
	Solution 2 for Area 1	2	4	10	60			\$8,210.00	
	Solution 2 For Area 2	2	4	8	40			\$6,040.00	
3.0	Construction Cost Estimates		2	20	40			\$7,010.00	\$7,010.00
4.0	Evaluate Recommendations with Three Historical Rainfall Events	2	2	14	40			\$6,560.00	\$6,560.00
5.0	Report and Recommendations	2	6	24	100	40	4	\$18,210.00	\$18,210.00
	Total Hours	\$24.00	\$32.00	\$134.00	\$585.00	\$52.00	\$4.00		
	Rate	\$210.00	\$175.00	\$145.00	\$94.00	\$90.00	\$65.00		
	Fee	\$5,040	\$5,600	\$19,430	\$54,990	\$4,680	\$260		\$90,000.00