



LEVEE IMPROVEMENT DISTRICT #19

HURRICANE HARVEY 2017

Levee Management Services
Post Harvey Summary Report



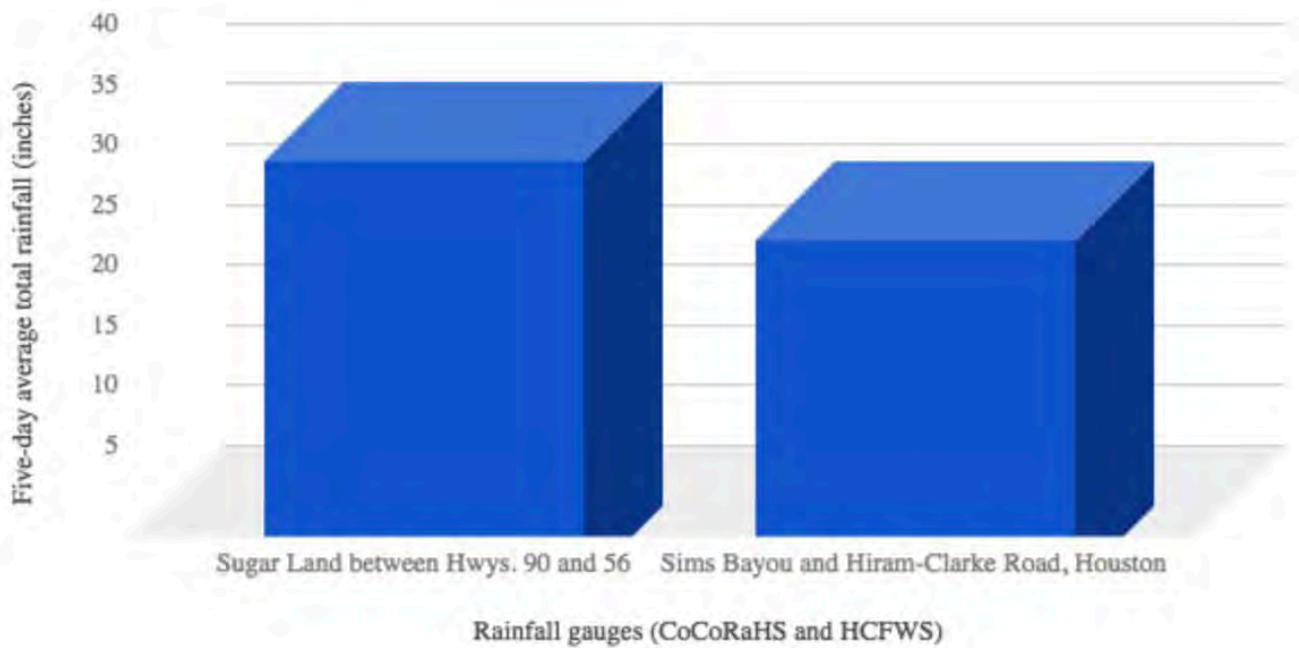
Hurricane Harvey

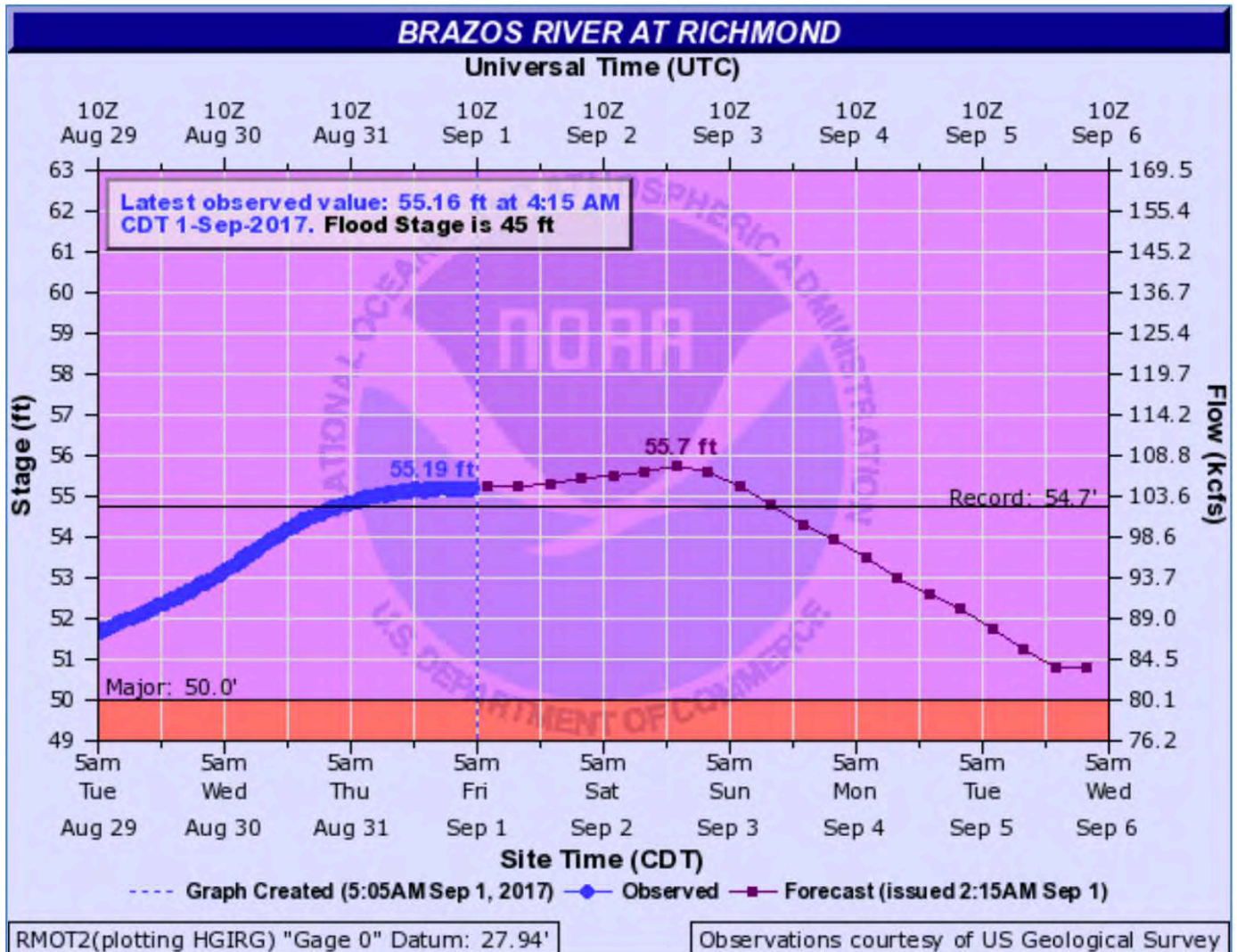
Executive Summary

Hurricane Harvey made landfall around 10:00pm CST on August 25th, 2017 between Port Aransas and Port O'Connor, Texas as a category 4. Harvey is the strongest hurricane to impact Texas since 1961 and the first category 4 storm to make landfall in the United States since Hurricane Charley in 2004. Rainfall in the Sugar Land/Missouri City area totaled in the 34-40-inch range which tested the Riverstone Community drainage facilities to their maximum capabilities.

Sugar Land/Missouri City

Aug. 26-30, 2017





Prior to the Storm:

Levee Management Services crews and personnel completed a final inspection of the levee and drainage system to insure all water ways were clear for proper drainage for the upcoming rainfall. LMS found no obstructions or areas of concern prior to Harvey. All outfall structures, LID detention areas, ditches and channel ways were all clear prior to the event. Pump Station, although brand new, was checked and inspected for proper operation prior to the storm. LMS personnel was in communication with local jurisdictions to share information of the LID status as well as hear updates that the Fort Bend County OEM was getting from the National Weather Service.



During the Storm:

As Harvey approached the Riverstone area, LMS per the EAP, began inspections of all drainage facilities to insure no new blockages impeded future water flow. As the rain continued and the Brazos River began to rise, the internal water drained out per gravity flow as designed with no issues. As the river continued to rise, LID 19 lost gravity flow on Sunday 8/27 and LMS began emergency pumping operations, manning the pump station 24 hours a day until internal water levels were back at normal and gates were open again on 9/4. At no time during the event did LID 19's pump station lose normal power, however we did have a small power surge which started up the backup generator for about 10 minutes until the LMS operator could flip everything back over to normal power. On 8/27 operators and engineers start to notice the pump station was unable to keep up with the extensive rainfall and made the call to start getting temporary pumps brought in to the district to help the internal water levels. With many complications in getting the temporary pumps on site and set up, they were up and operational, pumping water out on 8/31.

What was learned:

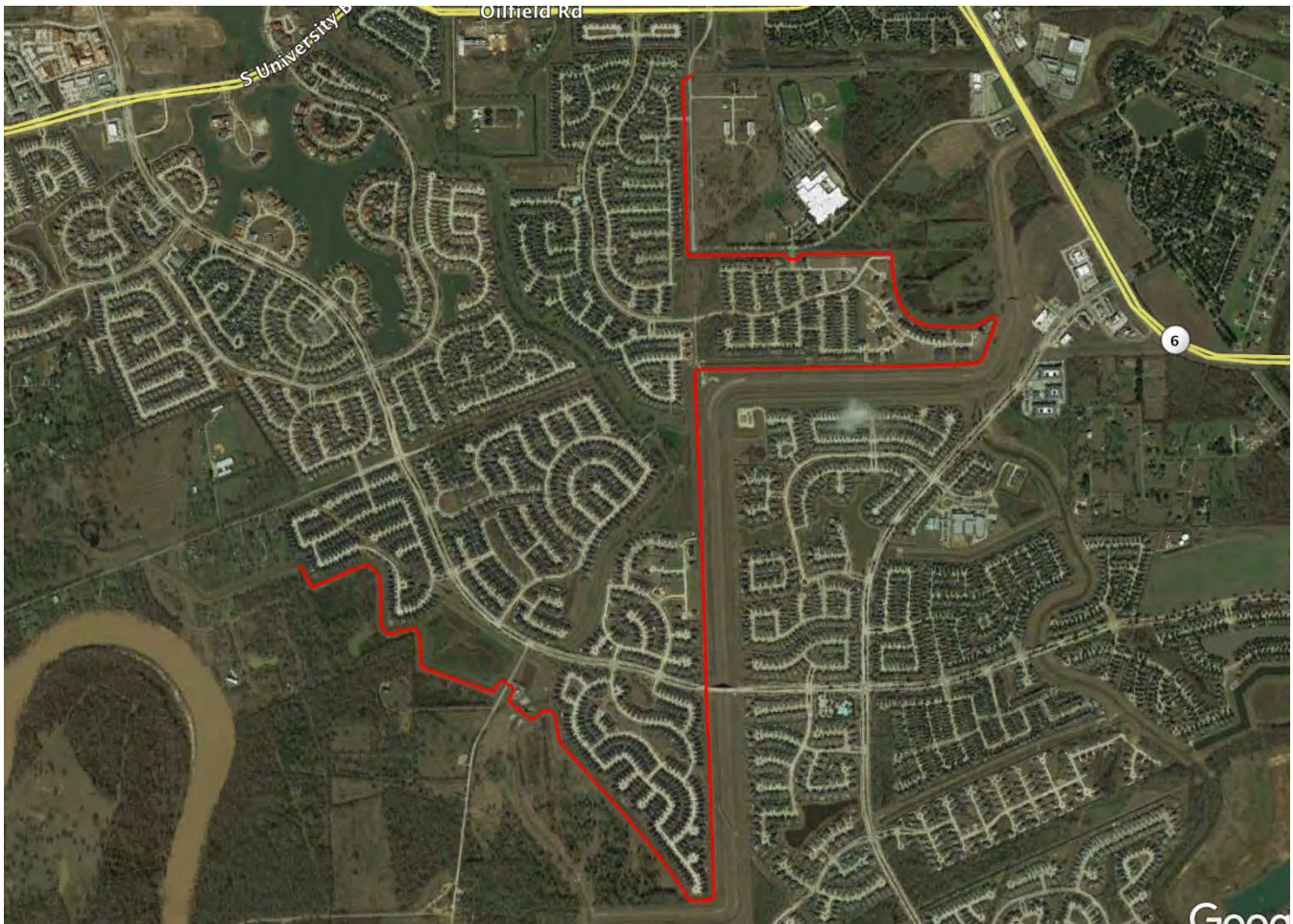
With unprecedented rainfall amounts in a short-day span, road closures made it very challenging for LMS employees to maneuver throughout the district by normal transportation. LJ Parkway was inaccessible for an extended period of time which made getting employees in and out of the pump station a challenge, and transportation was switched to boat and high water vehicles. The Pump Station, although operational on normal power and manned the entire time, was not suited for housing an operator full time and requests will be made to the Board of Directors for improvements as well as levee top access for emergency purposes. As rain continued to fall, the levees became so saturated that the access and inspection by levee top became unsafe. At that time aerial and boat inspections took place to continue proper operations per the EAP.

After the Storm:

A full inspection of the district has been completed Post-Harvey. Below is the report by LMS for status of levee and action moving forward. The sections of the report have been split up by segment of Levee, Outfalls, Pump Station and Drainage.

Levee System:

After detailed inspection, no serious issues were found on the levee in LID 19. No signs of erosion, sloughing or structure damage. Extensive rutting on the levee from LJ Parkway Bridge, South to the Pump Station. Rutting was caused by LMS during inspections of the levee and temporary pump delivery. LMS has already begun repairs of the levee top as approved by the board and coordinated with the district's vegetation contractor for treatment. Trash and debris is throughout the levee system and will be cleared throughout future inspections. High water marks have been taken for the new Brazos River record of the 55.2 crest.





West Entrance Heading South





West Section Heading South towards Thompson Ferry





South Levee Facing Thompson Ferry Rd.





South Levee Heading North toward LJ Parkway Bridge





North of LJ Parkway heading North





North Levee heading East





North East Levee Heading to Elkins High School





North Levee, South of Knights Ct. Facing West





North Levee Parallel with Thompson Ferry North







Outfall Structures and Drainage:

After complete inspection on LID 19 Outfall Structures, no drainage facilities were damaged or collapsed after the heavy rains and river elevations. Extensive clean up throughout the district will take place to clear of silt and debris from concrete structures and open ended pipes to ensure proper drainage in the future. All sluice and flap gates were inspected for damages to gates and hardware. No damages are present on any structure and all gates have been completely cleared of trash, regreased and exercised for proper operation for future events. Down limbs and trees that ended up around the concrete structures have been removed and outfall weep holes that were clogged due to high water, will be cleared in the near future for proper operation of the structure. Some minor erosion is present on the side slopes of the detention pond that can easily be regraded and reseeded upon completion. All drainage facilities in the district did not receive any damage from the rain and river events in this disaster.

Pump Station Intake Structure





Steep Bank Creek at the Pump Station Internal



Flap Gates and Discharge Structure Outside the District





Internal Slope Paving and Detention Area





Steep Bank Creek Detention Area







Internal Drainage Ditch North Levee





Pump Station:

A full inspection of the pump station has been completed by both LMS after Hurricane Harvey. The pump station is in full working order; however, one storm water pump shock absorber during shut down bent and a part is on order to replace. The pump is still fully operational and will still pump water at full capacity but the flap gate door slams shut instead of closing slowly. Although the station never lost power, a complete work up on the generator was completed as well to ensure future operation. The computer system in the pump station that monitors pump station operations during the power shortage, fried the monitor to the computer and a sensor to pump 2. All information of pump operations was able to be pulled from the computer, only the screen and sensor needs replaced. Also, noticed during the storm, is the access from the pump station to the levee is very limited. Operator will also recommend a driveway from the pump station building on the levee top be installed for access as well as a working space should additional temporary pumps ever have to be brought in to assist in pumping operations. Pump Station is fully operational should another storm event occur.

LID 19 Steep Bank Creek Pump Station





Generator Panel



Steep Bank Creek Drainage:

LMS completed a detailed inspection of Steep Bank Creek after Harvey. There are several areas that have down trees and limbs from the storms and water levels experienced during Harvey. An abundance of trash and debris has been left throughout the channel from natural drainage as the water receded in the district. LMS has already contracted to begin clean up in the channel and this work will continue throughout the rest of the year.























In Conclusion:

Levee Improvement District 19 overall is in great shape after the disaster of Hurricane Harvey. Clean up and maintenance work throughout the district has already commenced and will proceed throughout the rest of the year. LMS has already handled all the main priority items to ensure that the district is always ready for the next storm, whenever it may occur. The rest of the clean-up and general maintenance will continue under the allotted contract hours we have agreed upon with the LID.

Moving forward in LID 19, LMS has a list of improvements on the operations side that will be requested to the board of directors to help handle future rain and river events.

1. Request hard topping levee in certain areas to help assist operator in inspections and staging areas throughout the district.
2. Rework district Emergency Action Plan to add now learned areas of concern for high water during an extreme rainfall event. Possibility of bringing in temporary pumps to areas now known as areas that take on water more quickly than others while permanent repairs are being designed by district engineers.
3. Pump Station housing for operators during an extreme event.
4. Request rain and river gauges at district outfall structures.
5. Request lighting package at the pump station to help assist in pumping operations.
6. Expand video camera capabilities to show water levels throughout outfall structures.