


Fort Bend County Levee Improvement District No. 2

Modernizing drainage systems inside a fully developed levee



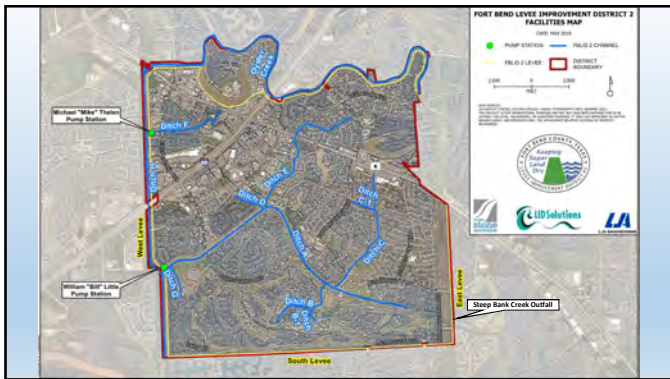
TFMA Fall Technical Summit
Friday, August 30, 2019

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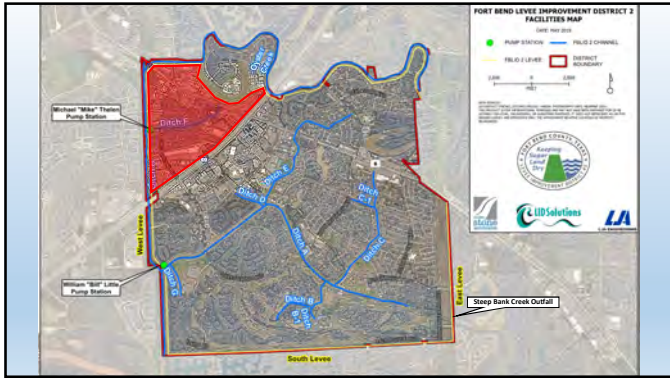
Agenda

- Introduction
 - Phil Martin, CFM – Mike Stone Associates
- Modeling and Design Criteria
 - Mark Pauls, PE, CFM Freese & Nichols
- Pump Station Construction
 - Ron Cass, PE, PMP - AECOM
- Drainage & Storage Improvements
 - Craig Kalkomey, PE, CFM – LJA Engineering
- Public Communication
 - Phil Martin, CFM – Mike Stone Associates

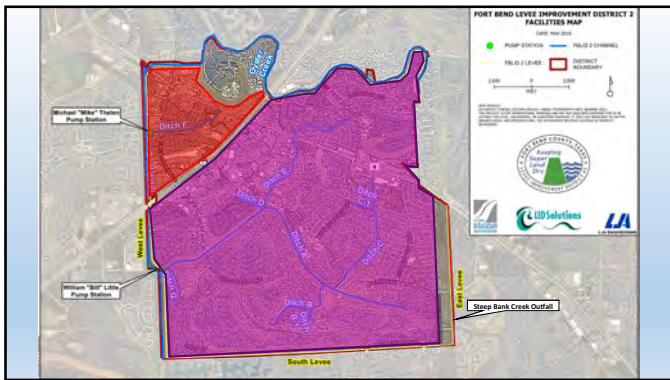
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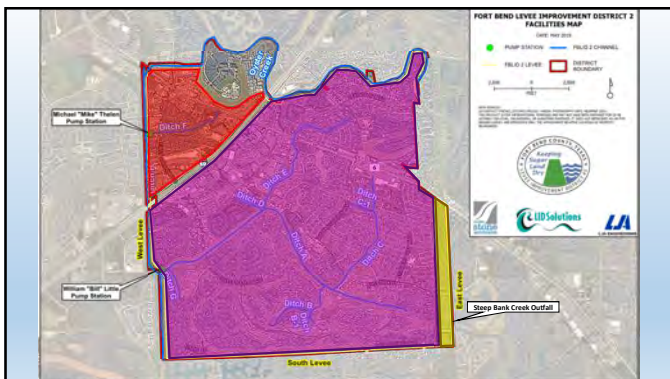
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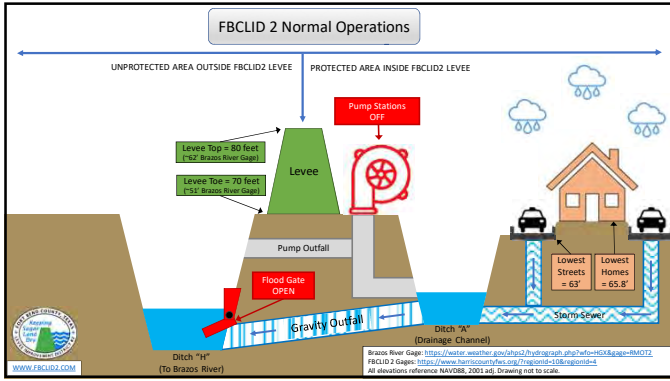
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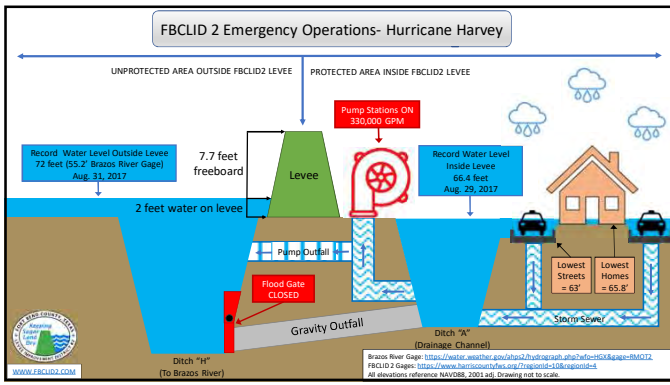
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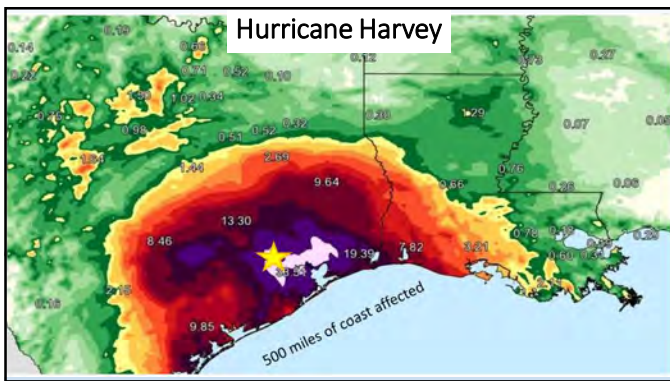
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Hurricane Harvey

- 230+ homes flooded
- Max structural flooding depth 8" (8-12 hours)
- Streets flooded for two days
- Thousands of more structures within inches of flooding
- Survey revealed 100+ structures below minimum elevation requirement

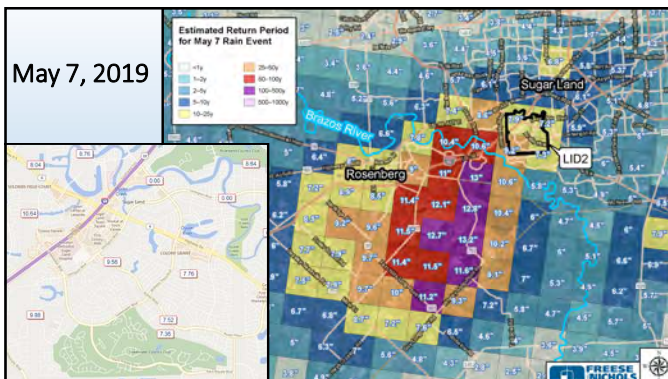
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Hurricane Harvey Update

- 2-year anniversary
- Half-way through 4-year, \$75,000,000 CIP
- Modernize 40-year-old drainage system
- Local Mandate - complete projects as quickly as possible
- Use latest design standards and best available data.
- \$48,000,000 authorized bonds
- In 2019 residents approved additional \$88,000,000 bond authorization

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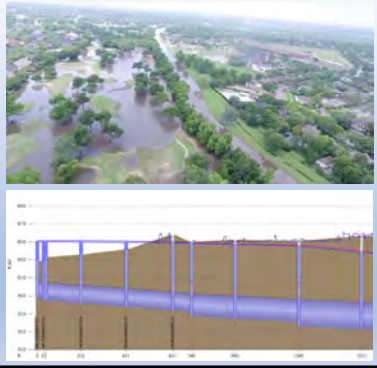
May 7, 2019



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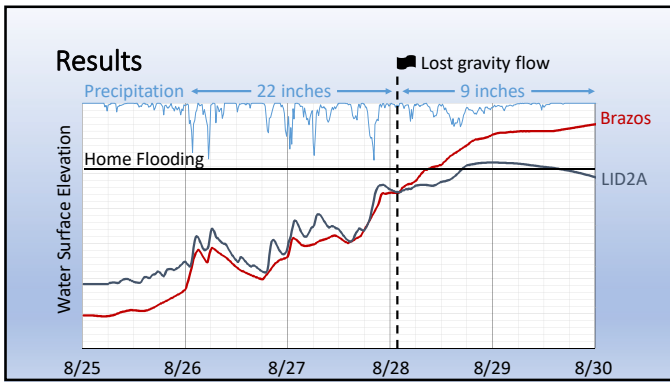
Harvey Analysis

- Why did we flood?
Limited storm drain capacity or limited pump capacity?
- Partnership between LID2 and City of Sugar Land
- Completed analysis by October
- Presented results to public November 8, 2017

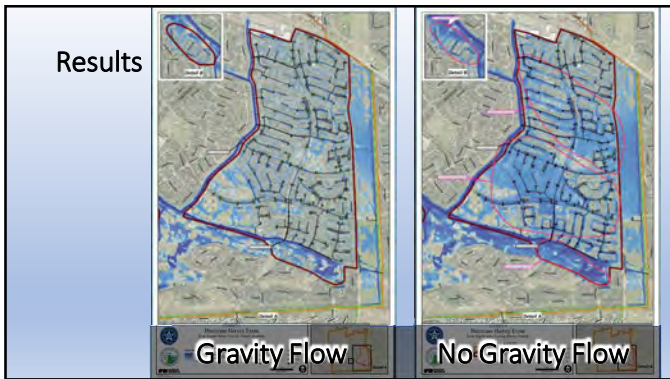


The top image is an aerial photograph showing a residential neighborhood with significant flooding, with water covering streets and yards. The bottom image is a cross-sectional diagram of a storm drain system, showing the ground surface, the storm drain pipe, and the surrounding soil. The diagram illustrates the flow of water into the pipe and the potential for flooding if the pipe is full or blocked.

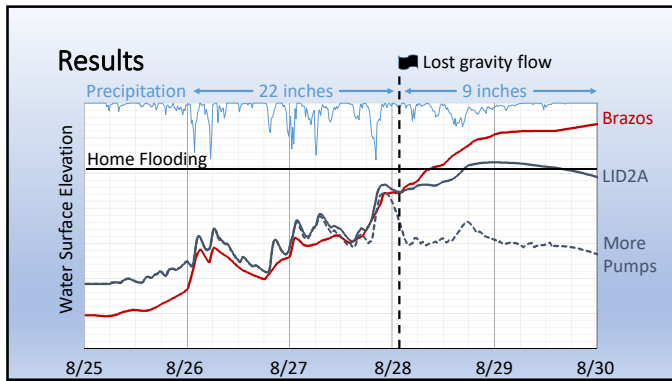
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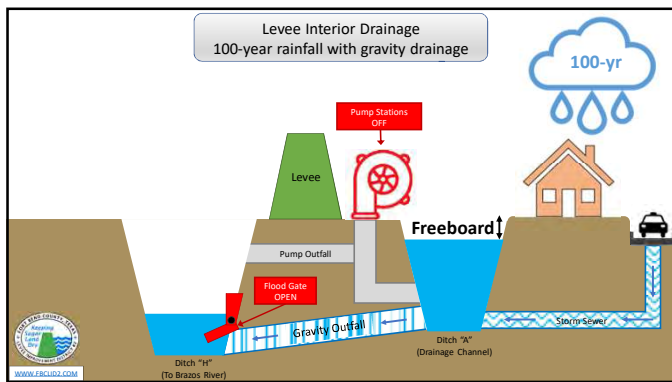
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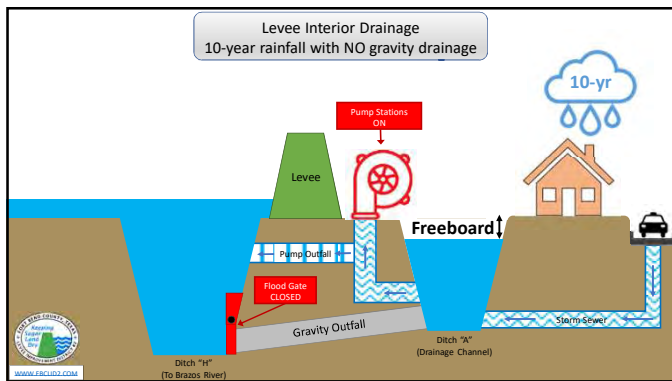
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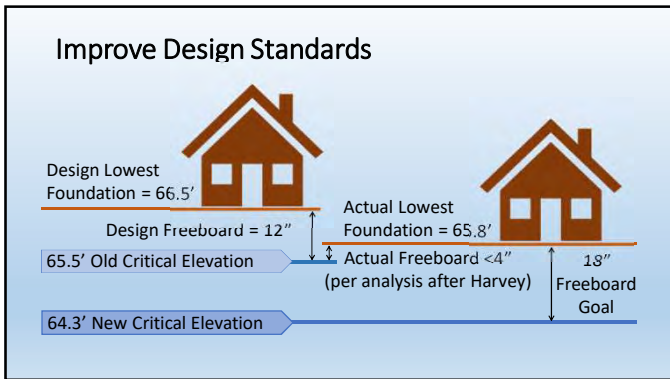
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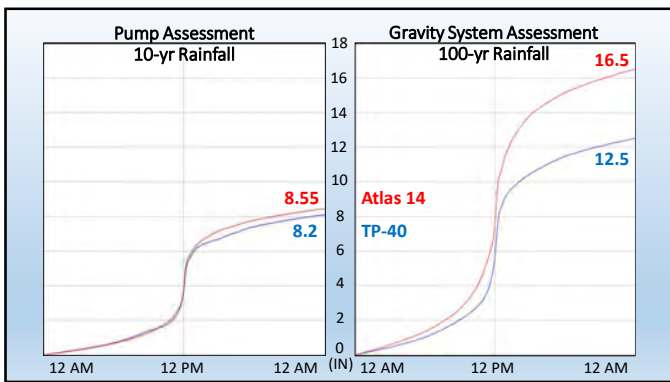
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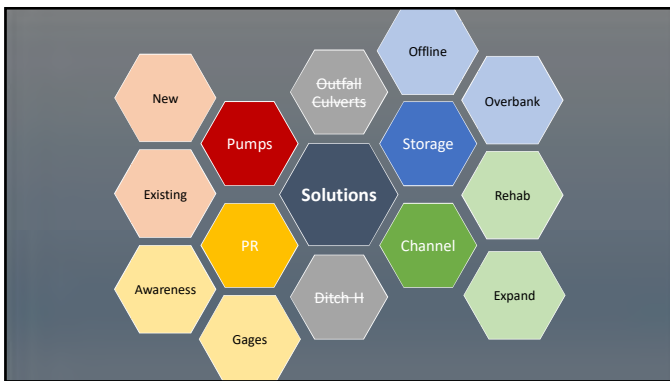
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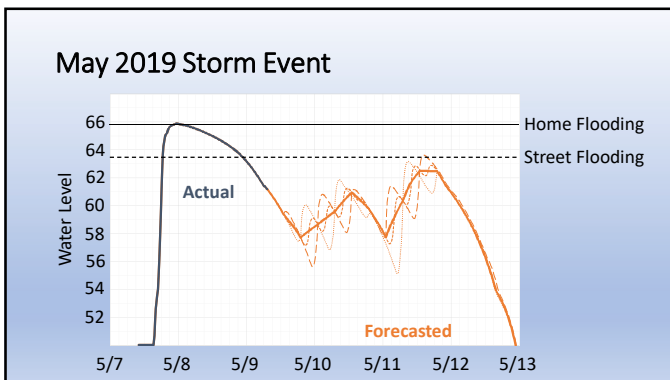
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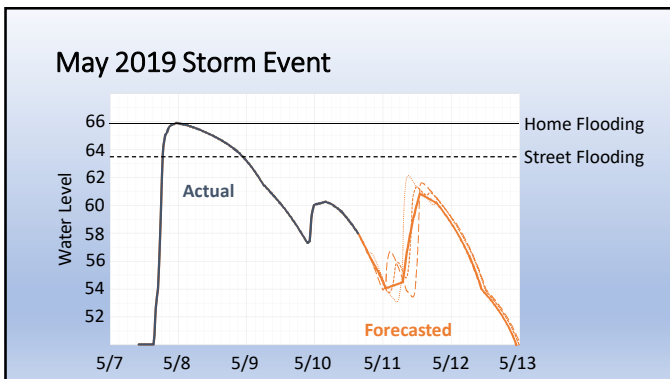
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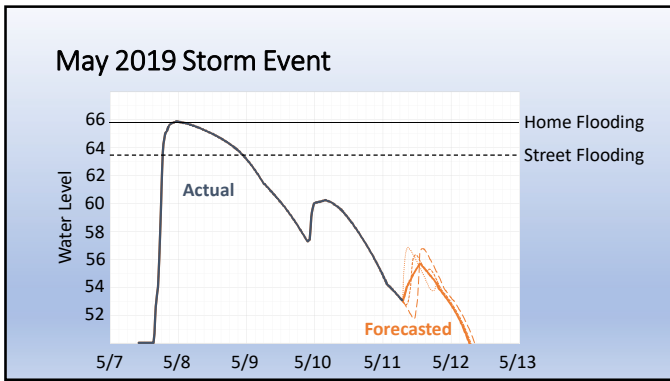
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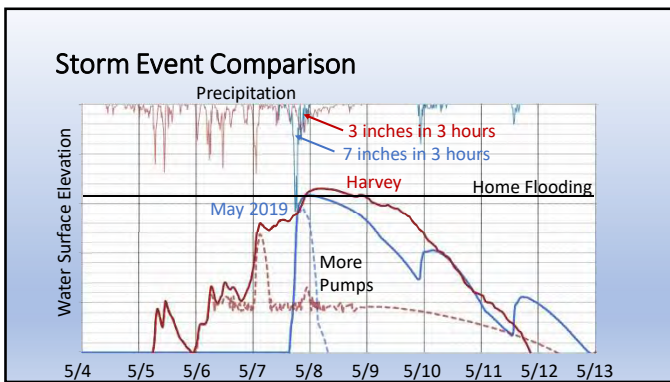
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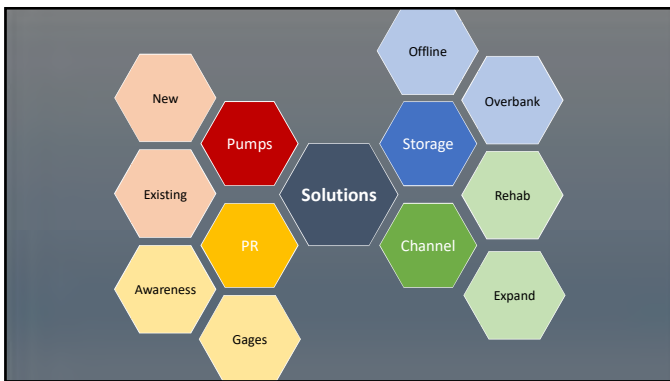
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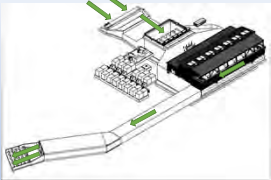
New Third Pump Station

Existing Pump Station A <ul style="list-style-type: none">• 240,000 GPM	Budget <ul style="list-style-type: none">• \$45 mil 	New Third Pump Station <ul style="list-style-type: none">• 980,000 GPM
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Combined Capacity 1,220,000 GPM



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Design and Construct New Pump Station

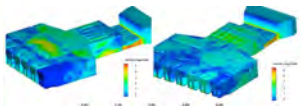
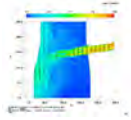
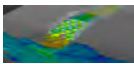
Key Features of New Pump Station

- Begin pumping earlier, as little as 6' of water in Ditch "A"
- Early operation allows District to reclaim storage during an event
- Natural gas generators will serve as backup power.
 - Enchanted Rock – Third party plant that sells power to grid
 - Reduced capital cost \$5-6,000,000
 - 28 generators provides redundancy
- Re-circulation system allows testing of pumps
- Aesthetic neighborhood design

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Design

- Pre-purchase of Pumps and motors
 - Wetwell CFD
 - Mfg pump design verification
 - Shop Testing
 - Field Testing
- Ditch H high flow erosion potential
 - Inputs to Ditch Armoring and USACE permitting



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Design and Construction Constraints

- Multiple utility relocations
- Acquisition and demolition of residences
- Limited access and onsite space
- Bordered on 3 sides by drainage channels
- Deep excavation combined with shallow groundwater
- Levee penetration and high flow erosion potential
- Major utility services – Utility Power, Utility Gas, backup generation



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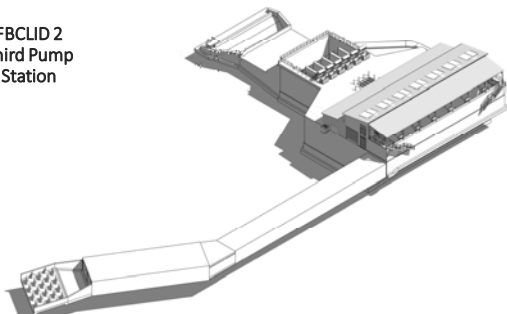
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FBCLID 2
Third Pump
Station



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Third Pump Station – Pump Building

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Third Pump Station – View from Oakland Drive cul-de-sac

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Increase Existing Pump Capacity

- Increase pump capacity to provide 18" freeboard with ATLAS 14 rainfall totals.
- Phase 1:
 - Replace 4 existing pumps nearing end of useful life
 - Pumps have been ordered and will be installed by fall 2019
 - Long lead item; manufacturing and delivery of the pumps (6 months)
 - Budget: \$550,000
- Phase 2:
 - Increase overall pump capacity as much as 150,000 GPM
 - Preliminary Design Phase complete by fall 2019
 - Budget: \$5,000,000

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Increase Pump Capacity – Mike Thelen Pump Station



- Thelen Pump Station (current)
 - 65,000 GPM firm capacity
 - 90,000 GPM total capacity
- Phase 1 Completion (2019)
 - 74,400 GPM firm (+14%)
 - 103,200 GPM total (+13%)
- Phase 2 Completion (2020-2021)
 - 250,000+ GPM total (+175%)

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Channel Improvements

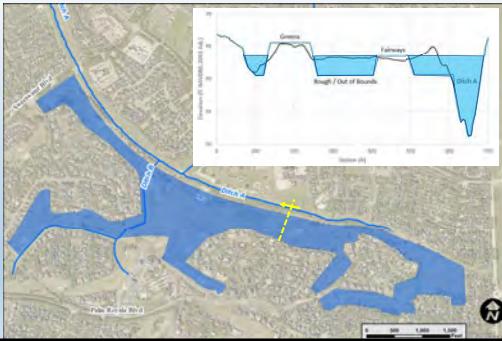
- Widen main drainage channel as much as possible within existing ROW
- Maintain 3:1 slopes
- Reduce maintenance berm to 20 feet
- Budget: \$2,000,000



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Overbank Storage – Sweetwater Country Club

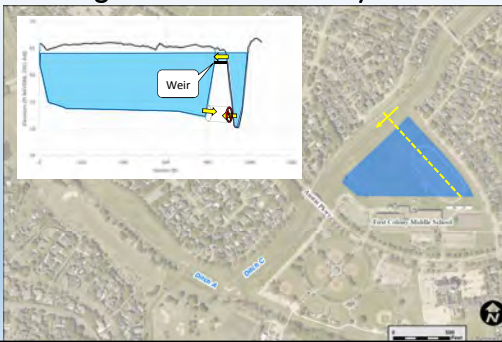
- Requires partnership with Sweetwater Country Club
- Reshape golf course rough and out-of-bounds areas.
- Creates additional overbank storage during only the most extreme rainfalls
- Budget: \$10,000,000



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Offline Storage – FBISD First Colony MS


- Requires partnership with FBISD
- Lower undeveloped land and track
- Creates additional offline storage during only the most extreme rainfalls
- Budget: \$4,375,000



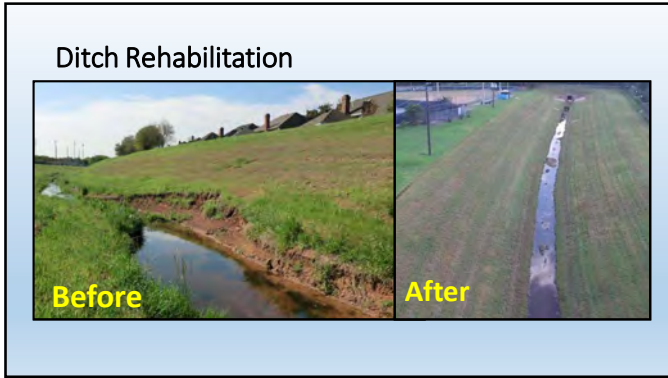
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Ditch Rehabilitation

- Rectify channel of ditches serving the areas most impacted
- Hard surfacing the main channel to prevent erosion and meandering
- Project completes Ditch Rehabilitation Program
- Budget \$12,000,000



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Improve & Enhance Communications

- Website improvements – ongoing process
 - Email & Text Alert system
 - Update & Expand Emergency Operations page
 - Update map address search and 360-degree views
- Increase Public Outreach
 - Quarterly newsletter & Annual Report
 - Fall and Spring public meetings
 - Provide speakers for any group in the area
 - FBCLID2 Information to in District HOA newsletters and websites
- Developing forecast for internal ditches

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Rain & Stream Gauges

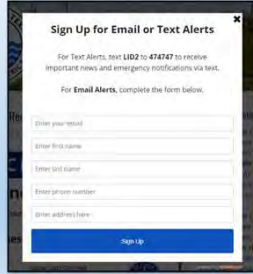
- Increase Flood Awareness:
 - Partner Harris County & City of Sugar Land
 - Replaced 2 old flood monitoring stations
 - Added 5 new flood monitoring stations
- Available for public view: FBCLID2.COM/GAUGES
- Adding cameras to monitor critical drainage areas

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Fort Bend County Levee Improvement District No. 2

Sign up for Email and Text Alerts

Visit: www.fbclid2.com



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Questions?

- Mark Pauls, PE, CFM Freese & Nichols
- Ron Cass, PE, PMP - AECOM
- Craig Kalkomey, PE, CFM – LJA Engineering
- Phil Martin, CFM – Mike Stone Associates



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