Fort Bend County Levee Improvement District No. 2

Modernizing drainage systems inside a fully developed levee

TFMA Fall Technical Summit
Friday, August 30, 2019

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
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

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

May 7, 2019
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

Results

- Water Surface Elevation
- Precipitation
- Home Flooding
- Gravity Flow
  - No Gravity Flow

- Lost gravity flow
  - 22 inches
  - 9 inches

- Brazos
- LID2A
May 2019 Storm Event

Water Level

Actual

Forecasted

Home Flooding

Street Flooding

5/7 5/8 5/9 5/10 5/11 5/12 5/13

66 64 62 60 58 56 54 52
New Third Pump Station

- Existing Pump Station A
  - 240,000 GPM

- Budget
  - $45 mil

- New Third Pump Station
  - 980,000 GPM

Combined Capacity: 1,220,000 GPM

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
  - National capital cost $5-6,000,000
  - Duplication provides redundancy
- Re-circulation system allows testing of pumps
- Aesthetic neighborhood design

Design and Construct New Pump Station

Design

- Pre-purchase of Pumps and motors
- Wetwell CFD
- Mfrp pump design verification
- Shop Testing
- Field Testing
- Ditch H high flow erosion potential
- Inputs to Ditch Armoring and USACE permitting
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
Third Pump Station – Pump Building

New Pump Station Schedule

Preliminary engineering - 6 months
Final design - 12 months
Property acquisition
Utility relocation
Permitting
Pump & Motor Manufacturing
Third Party backup Power Supply
House Demolition & Preparations for Underground Utilities
Pump Station Construction
Ditch Armoring Construction
Administration/Operations Building
Complete construction – Spring 2021
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

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)
  - 74,800 GPM firm (+14%)
  - 103,200 GPM total (+13%)
- Phase 2 Completion (2020-2021)
  - 250,000+ GPM total (+175%)

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
**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

**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

**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
Ditch Rehabilitation

Before After

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

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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Sign up for Email and Text Alerts
Visit: www.fbclid2.com

Questions?
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- Ron Cass, PE, PMP - AECOM
- Craig Kalkomey, PE, CFM – LJA Engineering
- Phil Martin, CFM – Mike Stone Associates