

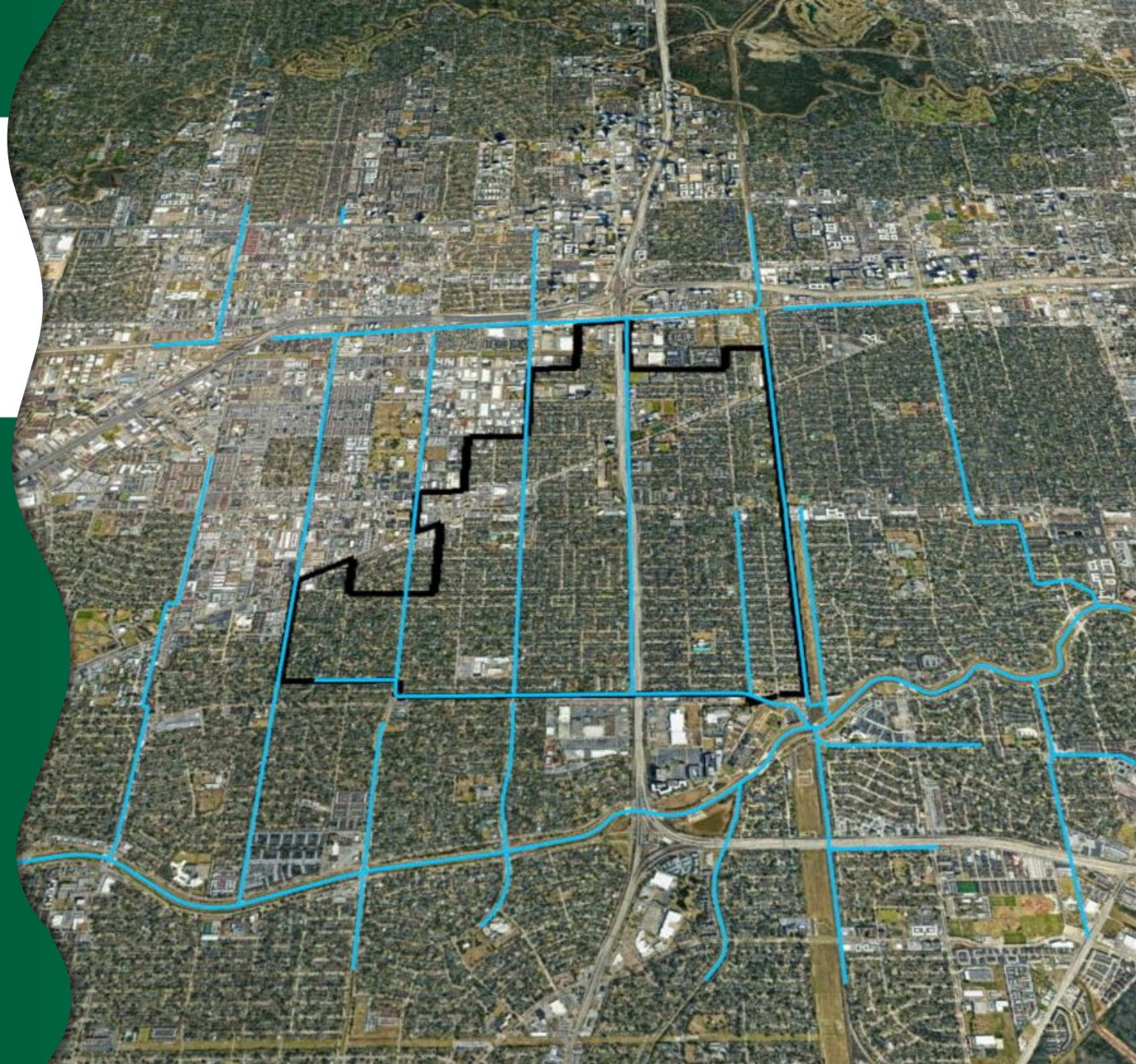
City of Bellaire

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# REGIONAL DRAINAGE IMPROVEMENT PROGRAM

Public Open House

*August 26, 2025*





# TEAM

## AGENCIES & STAKEHOLDERS:

- City of Bellaire
- Harris County
- Harris County Flood Control District
- TxDOT
- City of Houston
- Flood Hazard Mitigation Task Force (Bellaire)

## ENGINEERING

- Ardurra

# City of Bellaire



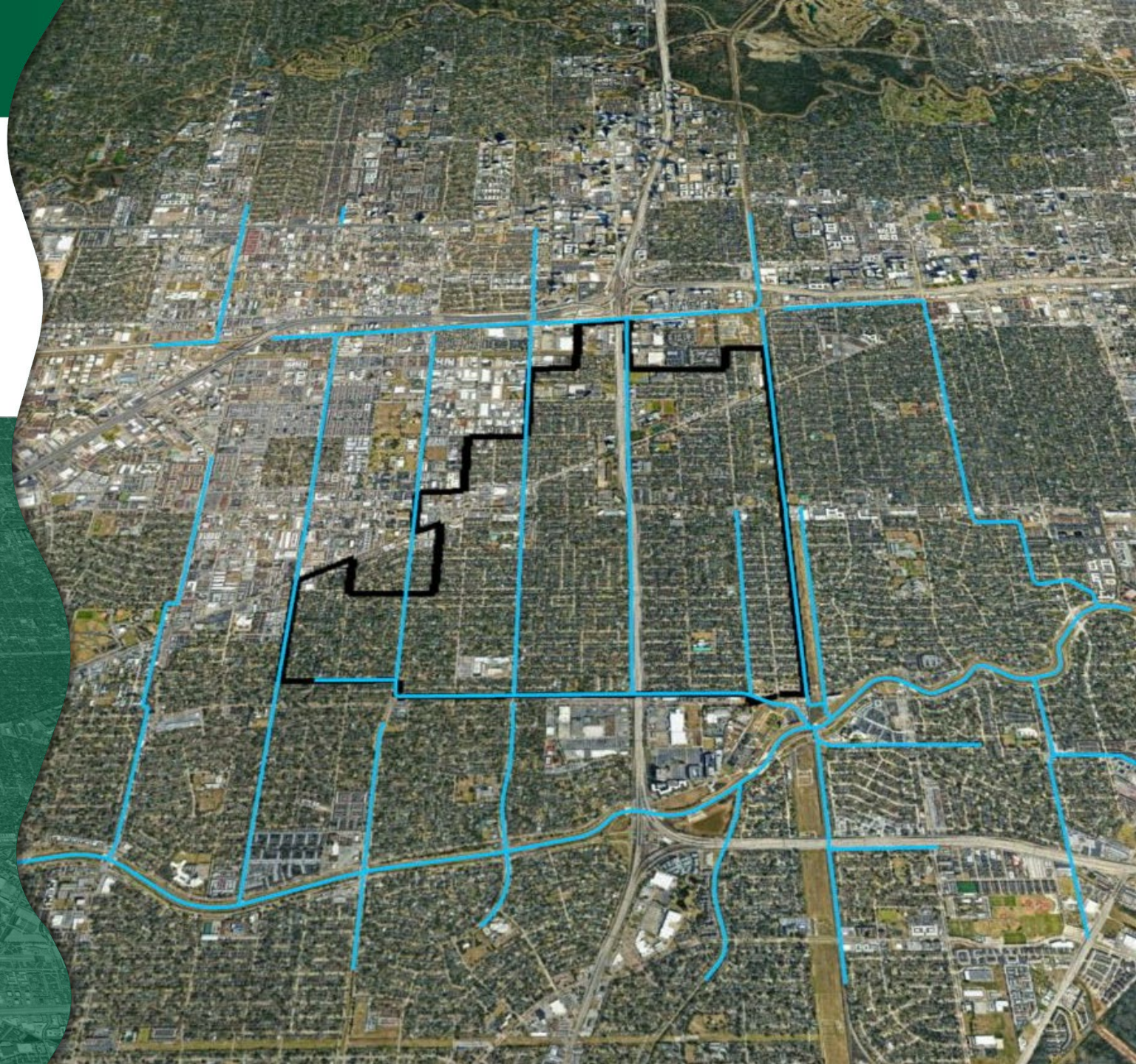
## City of Bellaire

FLOOD HAZARD MITIGATION  
TASK FORCE





# PROGRAM INTRODUCTION AND GOALS



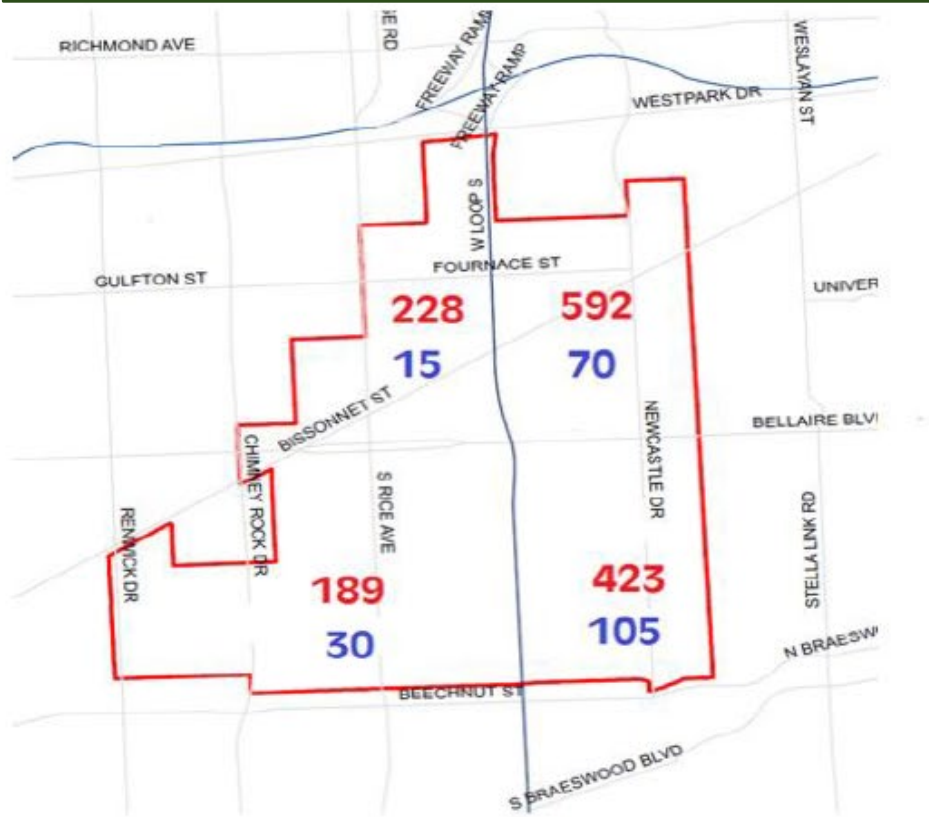


# PROGRAM BACKGROUND

- Bellaire initiated the **Master Drainage Concept Plan** following Hurricane Harvey, concluded in April 2022
  - *Jointly funded by TxDOT and HCFCFCD*
  - *Identified need for improvements to Cypress Ditch, the IH-610 drainage system, and interior city systems*
- Launched the **Regional Drainage Improvement Program** in April 2022
  - *Build off the initial work of the **MDCP***
  - *Completed Work Order #1 in December 2023*
  - *Completed Work Order #2 in January 2025*
  - *Initiated Work Order #3 in July 2025*

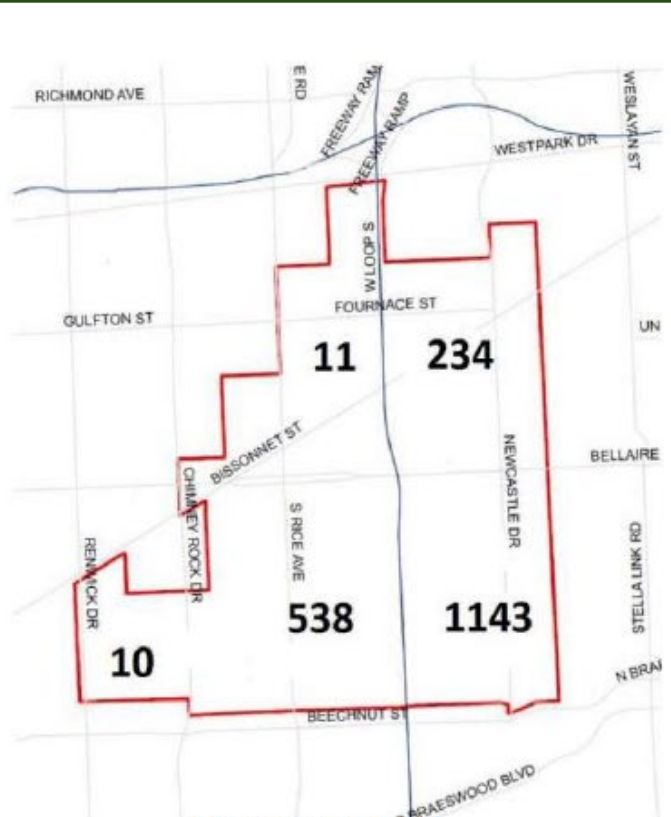
# MAJOR HISTORICAL FLOODING EVENTS

## FLOODED STRUCTURES



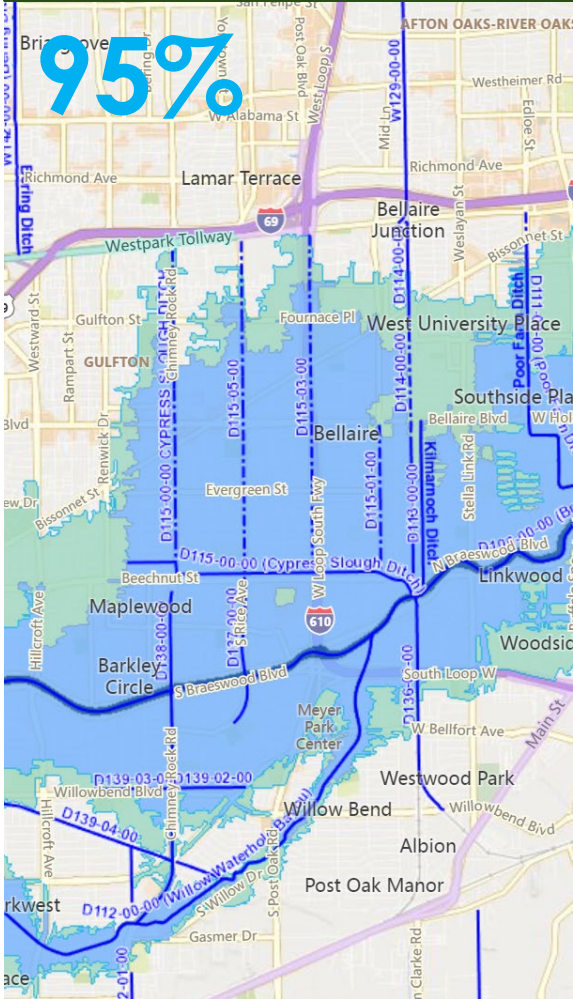
Reported Structures Flooded  
**Allison 2001**      **May 2015**

**1432**      **220**



**Harvey 2017**  
**Homes Flooded**  
**not including garages**  
**1936**

## FLOODPLAIN



# PROGRAM PURPOSE AND GOALS

## A foundation for a more resilient Bellaire

*Design infrastructure, guide development to mitigate impacts of future floods*

*Be a progressive model for living with water and cost-effectively adapting to a changing climate*

## An integrated, incremental approach

*Design improvements such that all properties in the City see a significant reduction in flood risk*

*Develop a strategy to implement improvements in a cost-effective, phased manner over the long-term*

## An opportunity for regional partnerships

*Develop projects that are mutually beneficial for multiple stakeholders*

*Identify opportunities for grant funding*

*Implement strategic plan to work with City of Houston to secure property and other benefits necessary to facilitate the first phase of the Program*

# THE EPICENTER OF A CHANGING CLIMATE

## NOAA ATLAS 14

Previous TP-40  
100-yr Rainfall **13"**/24 hours

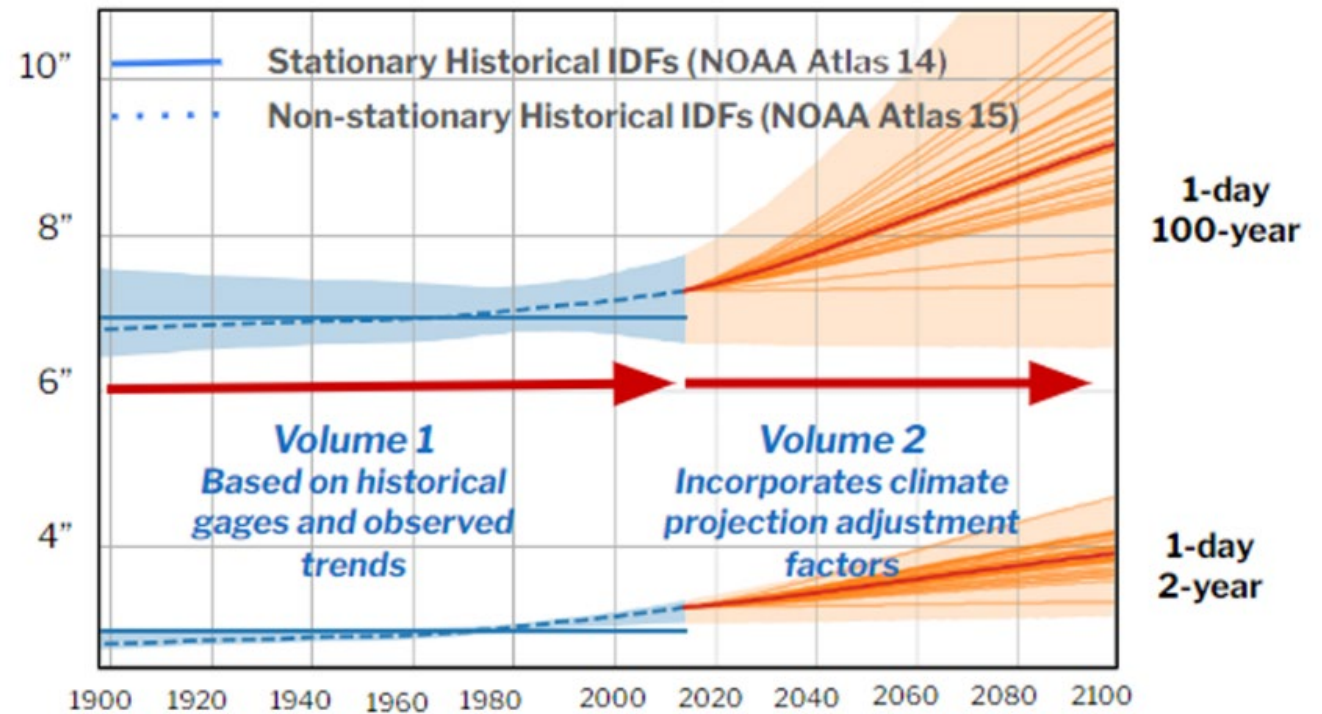
New ATLAS 14  
100-yr Rainfall **17"**/24 hours

**30% INCREASE**

### First Street Foundation (June 2023):

“Looking at highly populated cities such as Houston, Texas, the initial Atlas 14 correction is pronounced, increasing the likelihood of Houston’s 1-in-100-year flood event by 335% to a 1-in-23-year event. As the climate continues to warm, that same event will become a **1-in-11-year event by 2053, an 809% increase in likelihood.**”

## NOAA ATLAS 15 (FUTURE)

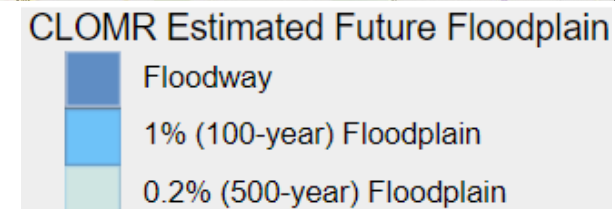
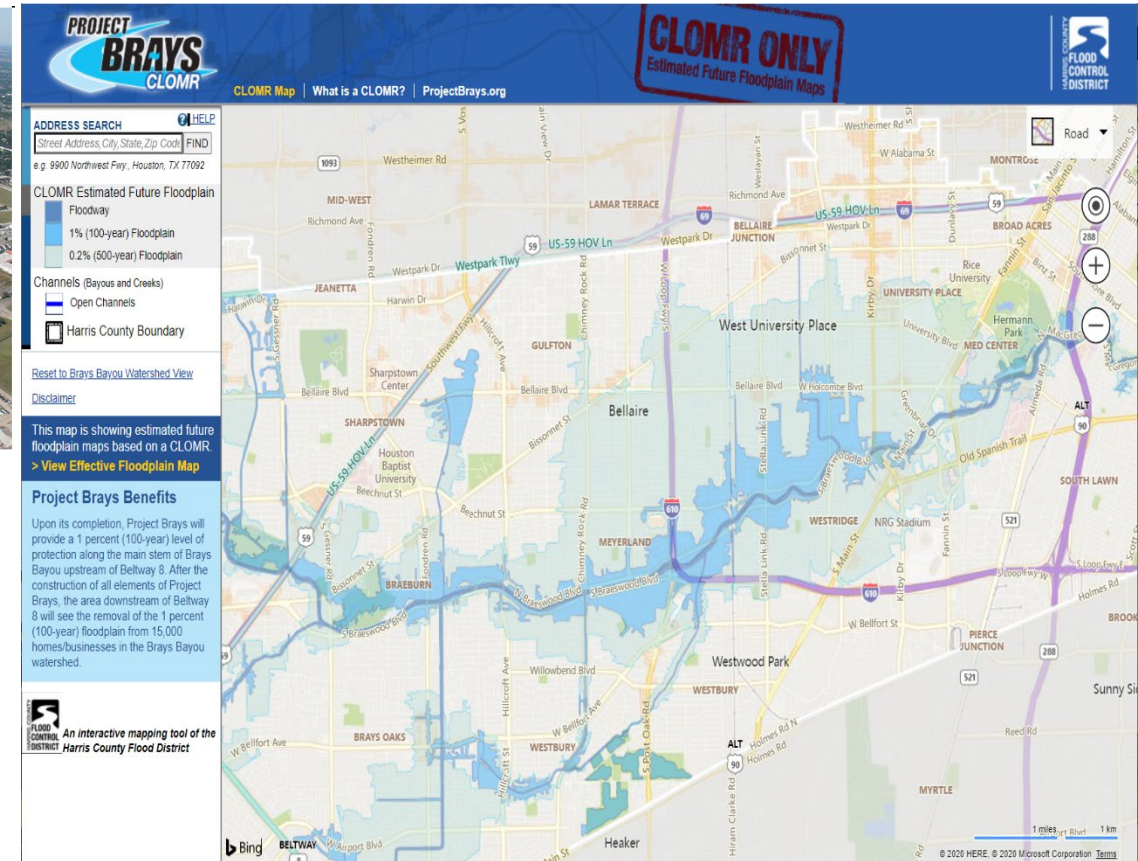




# LARGE REGIONAL IMPACTS FROM PROJECT BRAYS IMPROVEMENTS



- Project Completion-2022/2023
- Project Brays was designed to provide Pre-ATLAS 14 – 100 Year LOS
- Estimated future floodplain map is based on Pre-ATLAS 14 data
- HCFCFCD MAAPNEXT updates will include ATLAS 14 data. Will be available in 2024





# FLOOD RISK REDUCTION STRATEGY



## Development Codes

### Passed Chapter 9 changes on 11/21/23

- Sets FFE at 500-year + 1 foot
- Codifies non-residential drainage criteria



## Brays Bayou Improvements

### Project Brays completed Summer 2023

- FIRM changes to be incorporated into MAAPnext
- Significant reduction in WSE, extents of 100-yr, 500-yr floodplains



## Regional Drainage Solutions

### Improvements in Development

- First Phase: Regional detention, Cypress Ditch, IH-610 storm sewers
- Future Phases: S. Rice, Chimney Rock, Newcastle/Kilmarnock trunklines
- Westpark Corridor: being studied by HCTRA
- Richmond Plaza: under construction by COH



## Local Drainage Solutions

### Five CDBG-DR streets completed in 2023

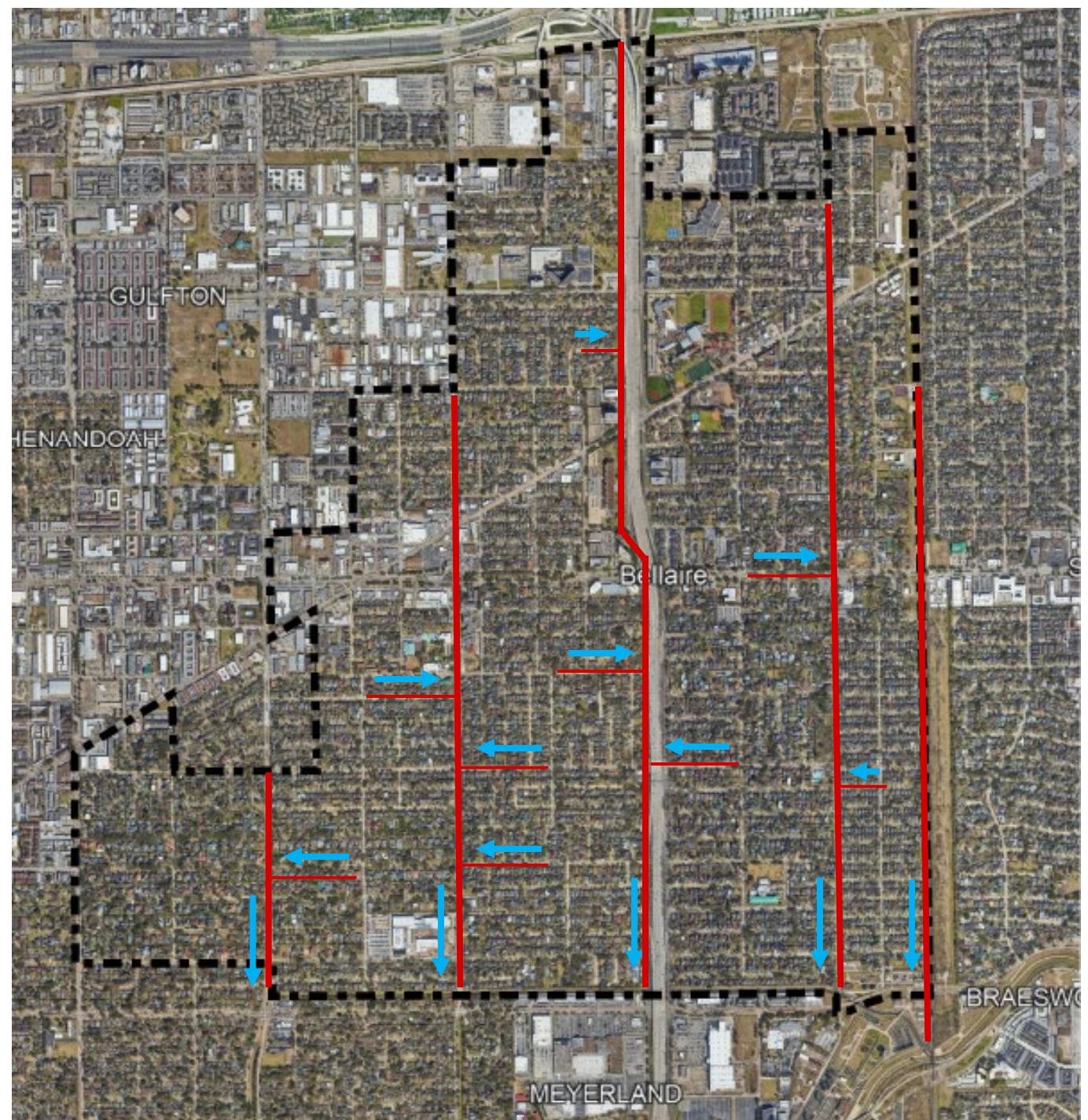
- Developing local street and storm sewer drainage design criteria
- Programming local street improvements in 2024

**Goal:** Implement flood risk reduction improvements across the City to minimize the risk of structural flooding and improve mobility during major storm events

**Requires:**

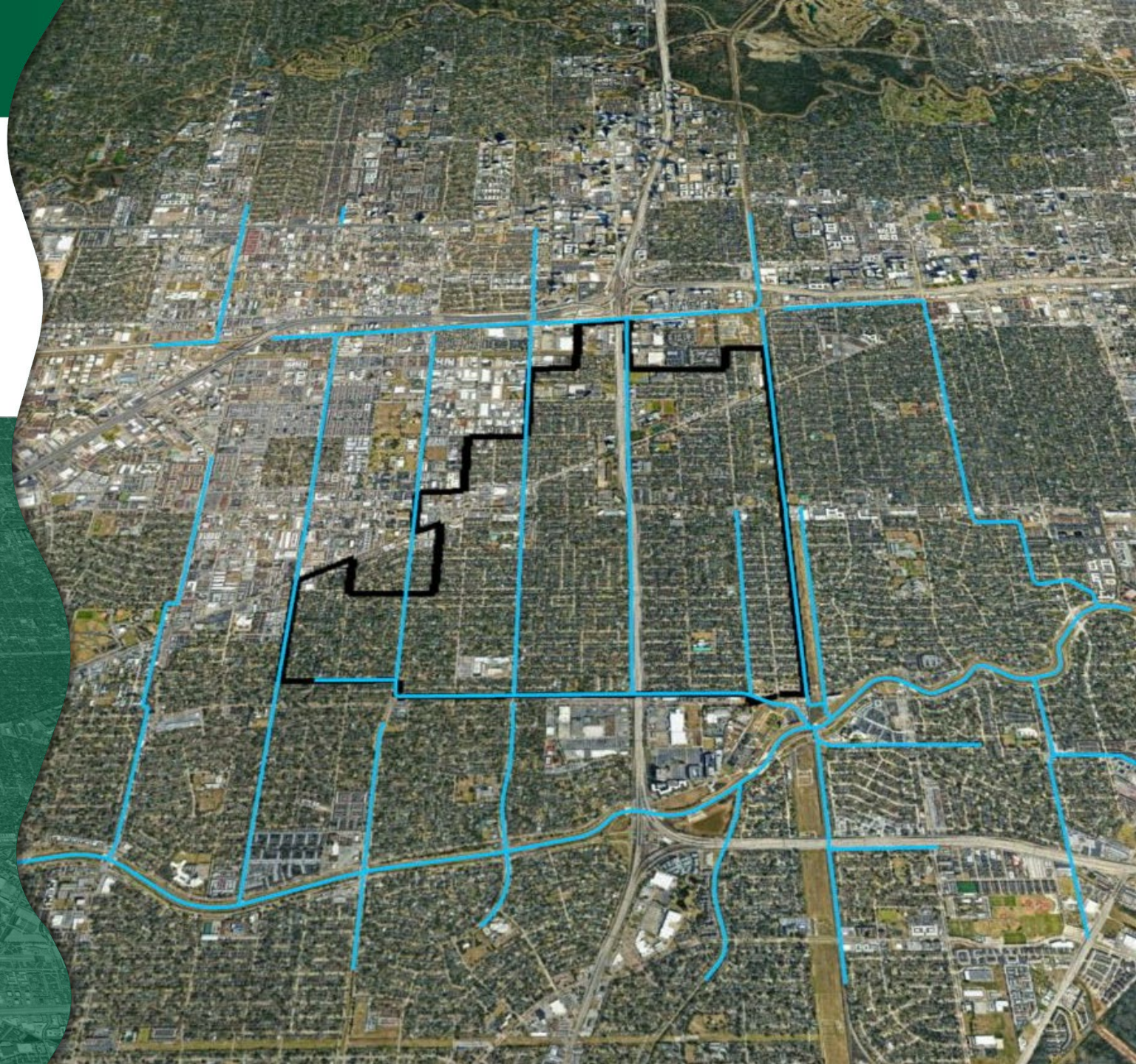
- Sizing storm sewers, designing streets to carry water out of neighborhoods
- Sizing trunklines to carry water out of Bellaire
- Creating capacity in Cypress Ditch to accept City stormwater flow without increasing flood risk along the channel
- Providing detention to mitigate impacts to Brays Bayou

*Multi-purpose improvements provide regional benefits extending beyond Bellaire City limits*





# CURRENT PROGRAM STATUS





# MAJOR PROGRAM INITIATIVES





# I FLOOD RISK MANAGEMENT OBJECTIVES

## Codes, Standards, and Design Criteria

- Establish flood risk reduction standard to be implemented City-wide
- Develop cost-effective codes and design criteria to guide development, infrastructure improvements

## Brays Bayou Improvements

- Complete Project Brays to reduce Bayou water surface elevations
- Support partners in the identification and delivery of additional Brays Bayou improvements

## Regional Drainage Solutions

- Develop trunkline improvements to meet the flood risk reduction standard
- Determine mitigation requirements necessary to accommodate trunkline improvements
- Develop phasing plan for trunkline improvements
- Identify opportunities for partnerships and external funding

## Local Drainage Solutions

- Develop phasing plan for improvements to local drainage (streets and storm sewers)
- Develop funding strategies to facilitate long-term implementation and O&M

# DRAINAGE CRITERIA AND FLOOD ORDINANCE

## Drainage Design Criteria – Storm Sewer Design

- Neighborhood systems sized for the 2-year, 24-hour storm
- Major trunklines and collectors sized for the 5-year, 24-hour storm

## Drainage Design Criteria – Impacts Outside the ROW

- Homes built prior to TS Allison – WSE for the 25-year event kept 6-inches below FFE
- Homes built between TS Allison and Harvey – WSE for the 100-year event kept 12-inches below FFE
- Homes built after Harvey – WSE for the 100-year event kept 24-inches below FFE

## Drainage Design Criteria – Street Design

- Streets shall maintain 1 lane of travel up to the 100-year event
- Some streets designated as evacuation and emergency service routes, designed for even less ponding

## Flood Ordinance

- New home construction requires FFE at 500-year elevation + 1 foot



## 3 FLOOD RISK REDUCTION SOLUTIONS

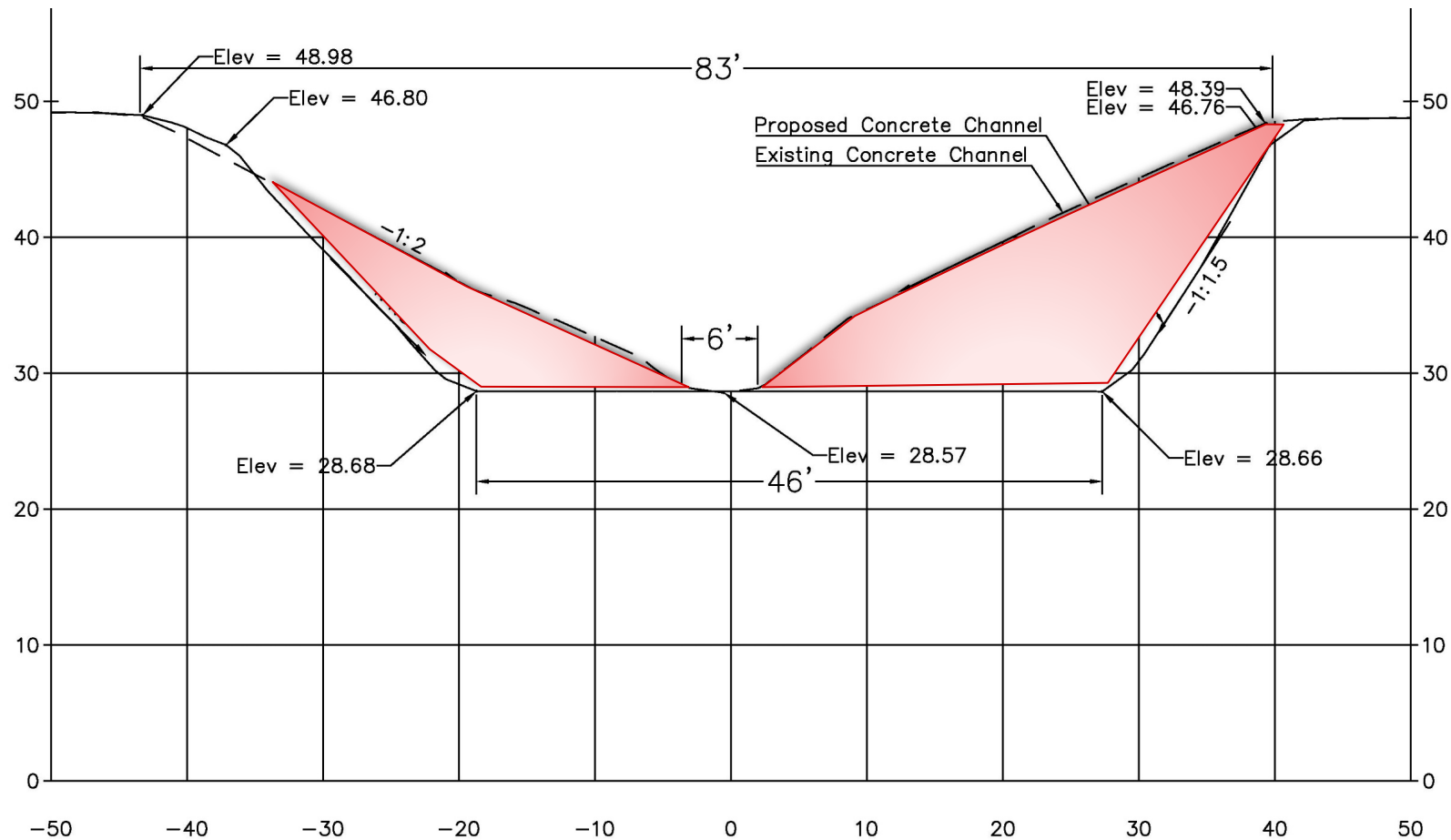
- First Phase projects – Cypress Ditch improvements, Region Detention, TxDOT storm sewers along IH-610
- Currently advancing 60% Design for Cypress Ditch, Regional Detention
- TxDOT is advancing a separate analysis, design for IH-610 systems
- Completed a land-swap agreement with City of Houston to acquire parcels along Newcastle Dr south of Beechnut for detention
- Agree to send Bellaire wastewater to COH SW WWTP for treatment, decommission/demolish Bellaire WWTP, construct detention

# CYPRESS DITCH CONVEYANCE CAPACITY IMPROVEMENTS AND REGIONAL DETENTION

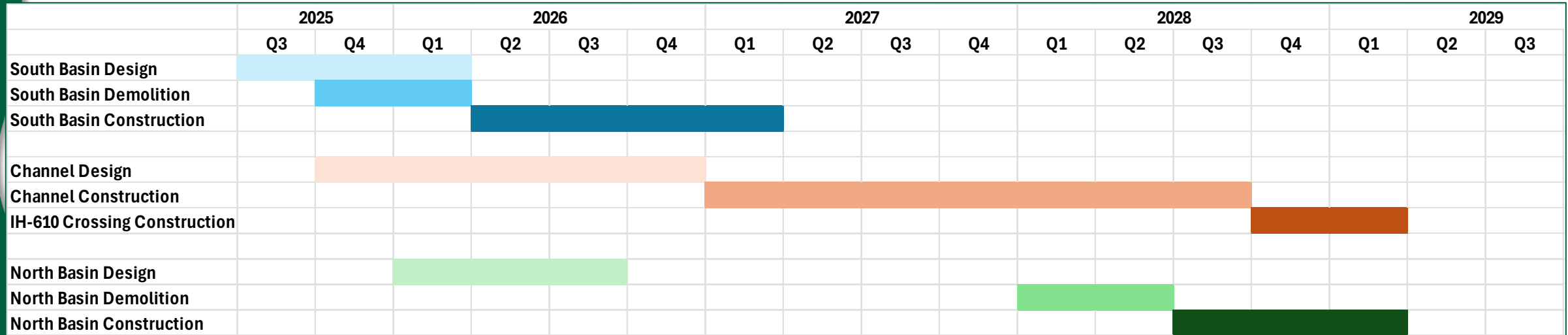




# CYPRESS DITCH CONVEYANCE CAPACITY IMPROVEMENTS AND REGIONAL DETENTION



# TENTATIVE TIMELINE FOR FIRST PHASE COMPLETION

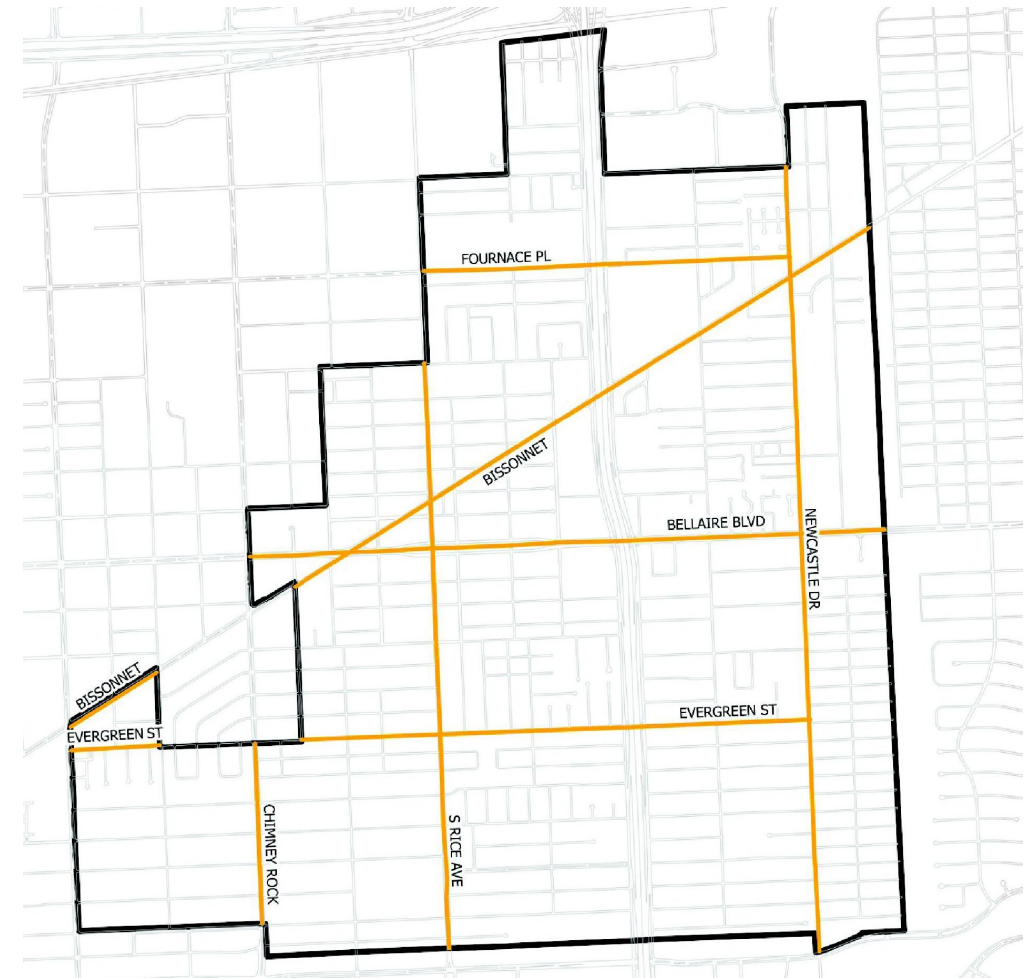


- Wastewater transfer must be constructed and online before Bellaire WWTP can be decommissioned, demolished to facilitate North Basin construction
- Detention Basins must be fully constructed before Channel Construction can be completed



# PLAN FOR FLOOD/DRAINAGE INFRASTRUCTURE CAPITAL IMPROVEMENTS

- Delineate routes to serve as emergency access and evacuation routes
- Analyze improvements to major corridors, the anchors for local drainage systems
  - *Pending FEMA/TDEM FMA grant award*



## 5 STRATEGIZE PROJECT FUNDING

- Near-term funding opportunities: grants, partnerships, direct allocations from state and federal governments
- Near- to medium-term funding: partnerships, grants, bonds
- Long-term funding: bonds, drainage utility fee
- Received a \$54M direct allocation from state of Texas, to be administered through the TWDB



FUNDING SOURCE	APPLICATION DATE	PROJECT(S) SUBMITTED FOR FUNDING	STATUS
CDBG-MIT	June 7, 2023	Cypress Ditch Central Portion submitted in 2023	Not awarded
DOT Reconnecting Communities and Neighborhoods (RCN)	September 28, 2023	Cypress Slough Trail	Not awarded
GLO Resilient Communities Program	Open to June 2028	Home Elevation Program	City opted not to accept funding
TWDB Flood Mitigation Assistance (FMA)	January 8, 2024	North Bellaire Flood Risk Mitigation and Resiliency Study	Moved to next level of review
HGAC Transportation Improvement Program (TIP)	February 13, 2024	Chimney Rock Corridor S Rice Corridor Newcastle Corridor	Submitted
TWDB Flood Infrastructure Fund (FIF)	April 15, 2024	Chimney Rock Area Drainage Improvements Study Newcastle/Kilmarnock Drainage Improvements Study Local Drainage Asset Management Study	Chimney Rock and Newcastle/Kilmarnock ranked 89* in the Prioritization List
Community Project Funding (CPF) FY2025	May 3, 2024	Cypress Ditch	Program cancelled
HGAC Water/Wastewater Utility and Flood Mitigation Priority Project Lists	August 14, 2024	Cypress Ditch Regional Detention Wastewater Transfer Project	Cypress Ditch identified as a Tier 1 (Top Priority) Regional Priority Project, others as Tier 2
Hazard Mitigation Grant Program (HMGP) DR-4781	February 28, 2025	Cypress Ditch	Submitted
Hazard Mitigation Grant Program (HMGP) DR-4798	March 14, 2025	Cypress Ditch	Submitted
Community Project Funding (CPF) FY2026	April 11, 2025	Cypress Ditch	Submitted

# 2024 BOND REFERENDUMS

- Two bond referendums approved in November 2024
- Wastewater Bond
  - \$30 million bond
  - Fund the decommissioning and demolition of the Bellaire WWTP, connection to the City of Houston Southwest WWTP, pay impact fees to facilitate the connection
  - Fund future wastewater collection and conveyance projects
- Drainage Infrastructure Bond
  - \$40 million
  - Initiate construction of the first portion of the Cypress Ditch improvements and Regional Detention
  - Supplement other state and federal funding to complete the entire project

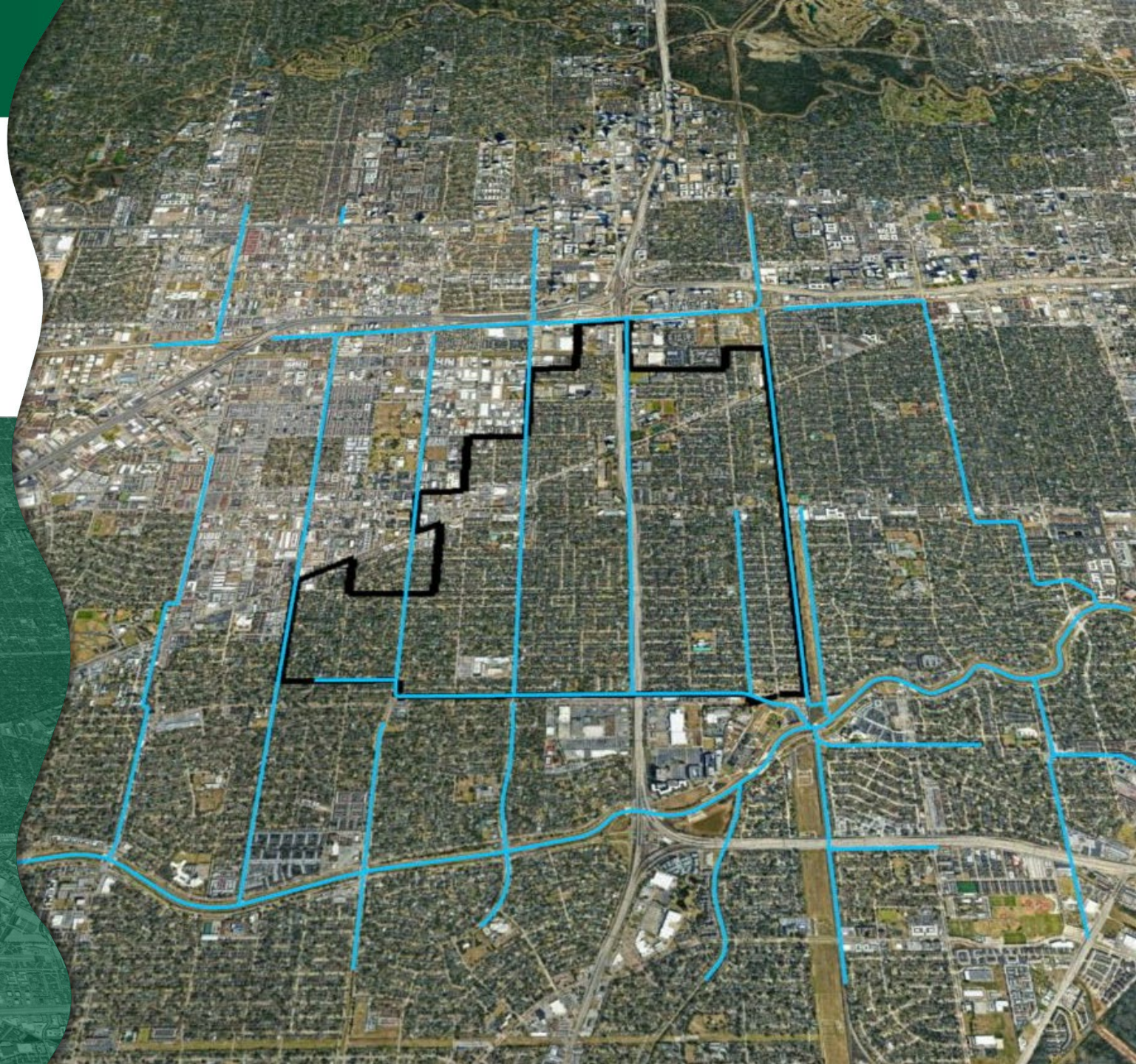


# DRAINAGE UTILITY SYSTEM AND FEE

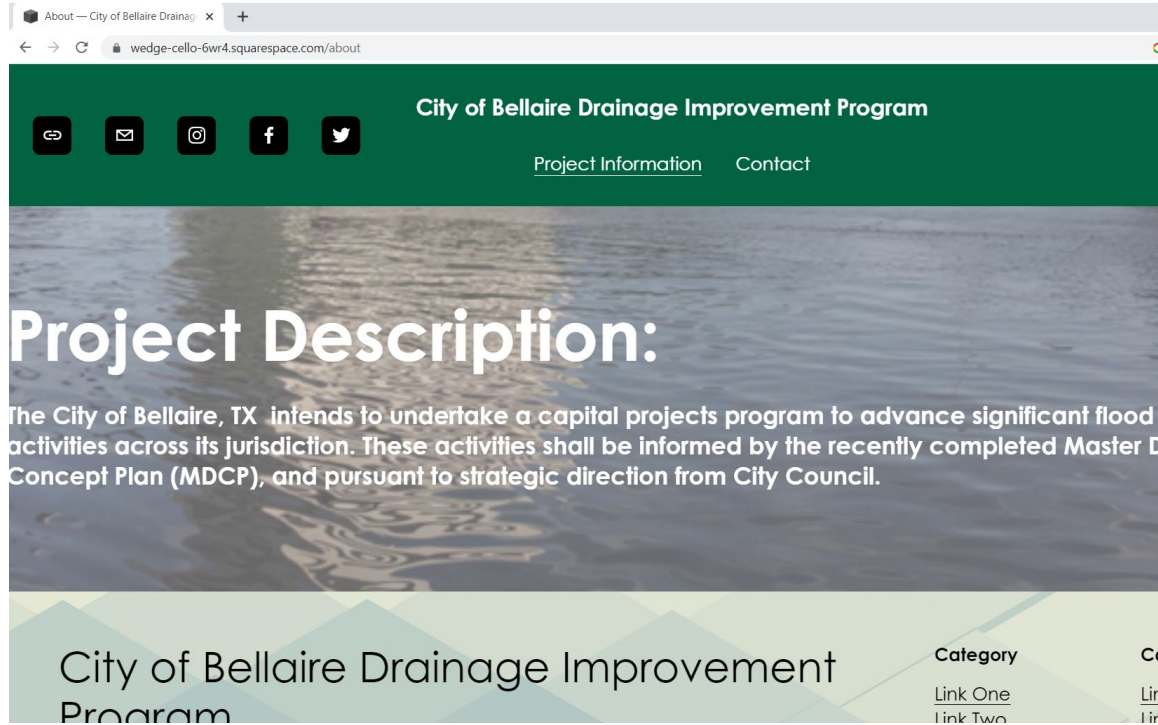
- Texas Local Government Code authorizes cities to establish stormwater drainage utility systems
- Includes the establishment and calculation of drainage utility charges and credits
- Establishing a drainage utility system creates a dedicated, consistent source of revenue for long-term O&M of the City's drainage infrastructure
- City will establish a schedule of drainage charges against property, offer drainage service on non-discriminatory, reasonable, and equitable terms



# OPEN DISCUSSION







# Questions?

Check the program website at  
<https://bellairedrainageimprovementprogram.org/>

Or email us at [drainage@bellairetx.gov](mailto:drainage@bellairetx.gov)

