

# Regional Drainage Improvement Program

City of Bellaire

Flood Hazard Mitigation Task Force

Meeting Date: April 11, 2023

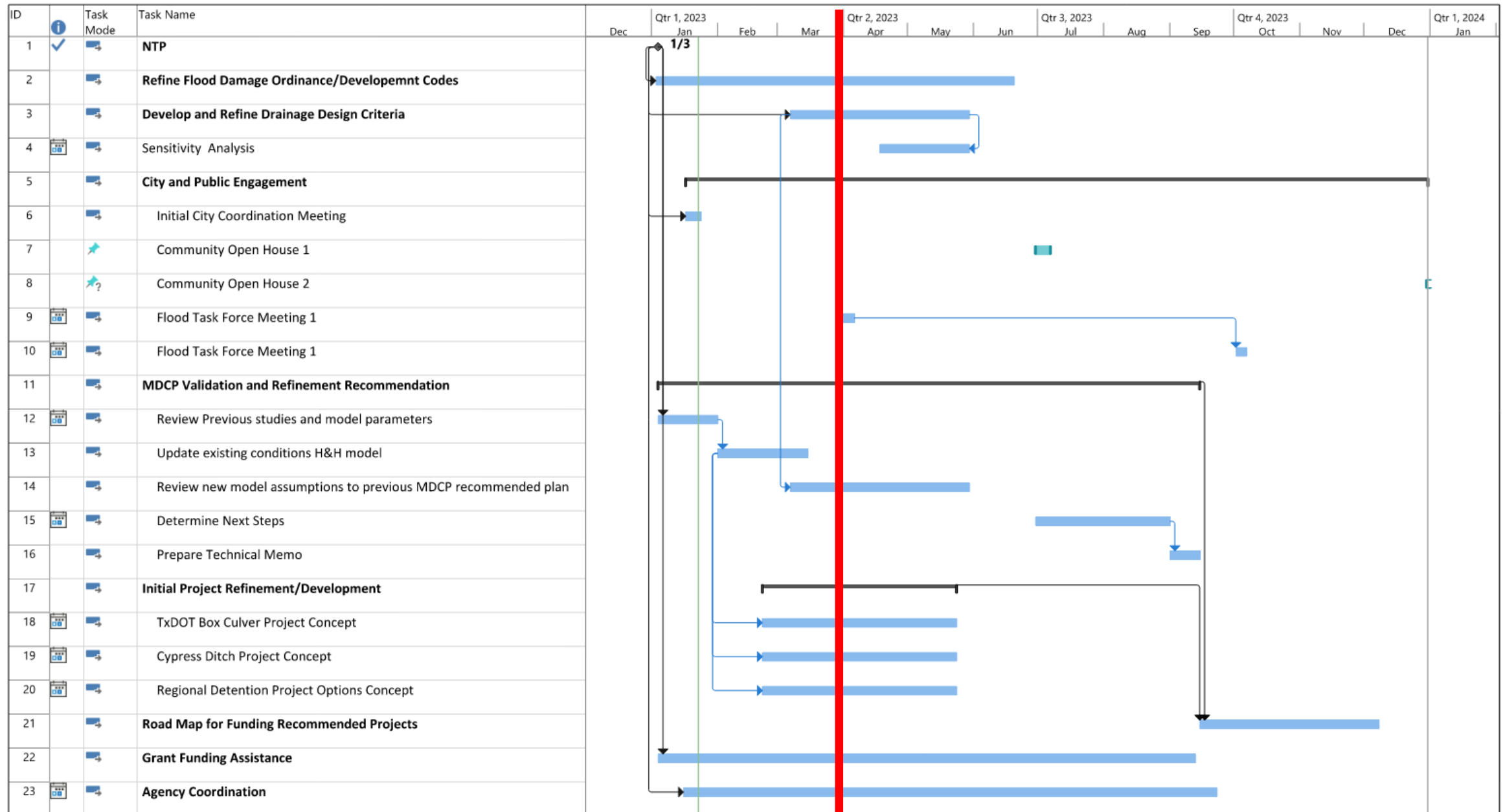
# Agenda

- Introductions and Flood Task Force History
- Flood Task Force and Damage Prevention Goals
- Overview of Current Drainage Program Status and Plan
- Flood Damage Prevention Ordinance History and Feedback from Task Force
- Drainage Criteria Establishment
- Future Potential Project Options
- Public Comment

# Scope of Work (Ardurra) – High Level

- Launch our flood risk reduction program efforts:
  - Staff / council engagement
  - Project partner engagement
  - Public engagement
- Quickly refine objectives, design criteria, and flood damage prevention ordinances
- Validate and review recommendations from the MDCP, allowing our new consultant to take ownership of the program moving forward
- Immediately commence efforts to advance high priority “first phase” improvements
- Develop funding roadmap
- Support pursuit of partner funding and submittal of grant applications

# Schedule



# Flood Hazard Mitigation Task Force History

# Flood Task Force History

- On October 2, 2017, the City Council adopted Resolution authorizing the establishment of the Flood Hazard Mitigation Task Force. ([Flood Hazard Mitigation Task Force | Bellaire, TX - Official Website \(bellairetx.gov\)](https://www.bellairetx.gov/flood-hazard-mitigation-task-force))
- Flood Task Force is an advisory board, established to assist City of Bellaire in making key decisions related to flood prevention.
- Flood Task Force was established to assist in developing Local, Regulatory and Regional Policy to update the Flood Hazard Mitigation Plan, and to remain in good standing in the Community Rating System (CRS) of the National Flood Insurance Program.

# Flood Task Force Goals

# Flood Task Force Goals

- Identify and assess hazards associated with the problem of flooding and provided recommended solutions for those problems
- Keep the public informed of its deliberation and recommendations, and any proposed changes to the floodplain structure for the City of Bellaire
- Assist implementation of post-flood Hazard Mitigation Plan for the City of Bellaire

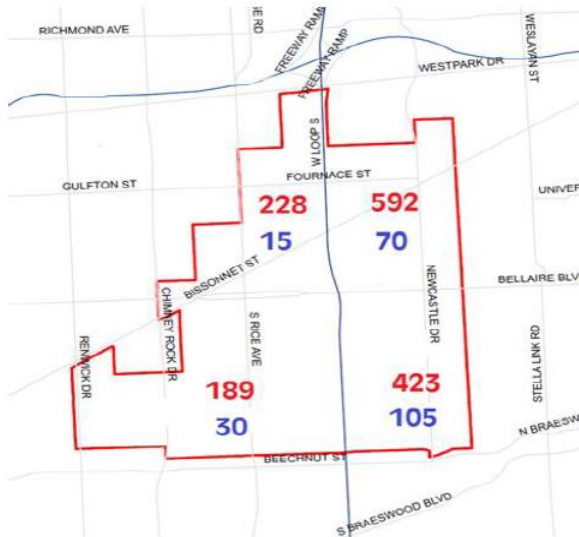


# Overview of Drainage Plan



# Major Flooding Events

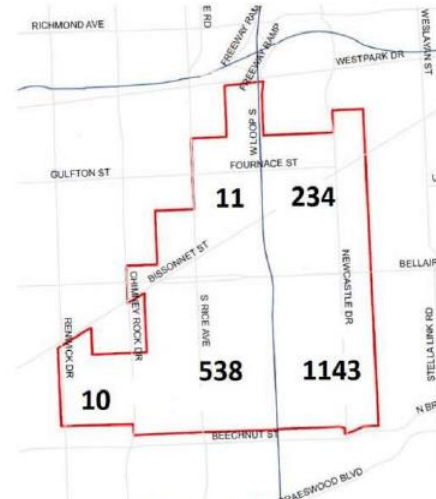
## Structures Flooded



Reported Structures Flooded  
Allison 2001 May 2015

1432

220



Harvey 2017  
Homes Flooded  
not including garages  
1936

- 2001 Tropical Storm Allison (200-Year Rainfall Event)
  - ~1400 Buildings Flooded
- 2015 May (25-Year Rainfall Event)
  - ~220 Buildings Flooded
- 2017 Hurricane Harvey (greater than 5000 Year Event)
  - ~2,000 Buildings Flooded

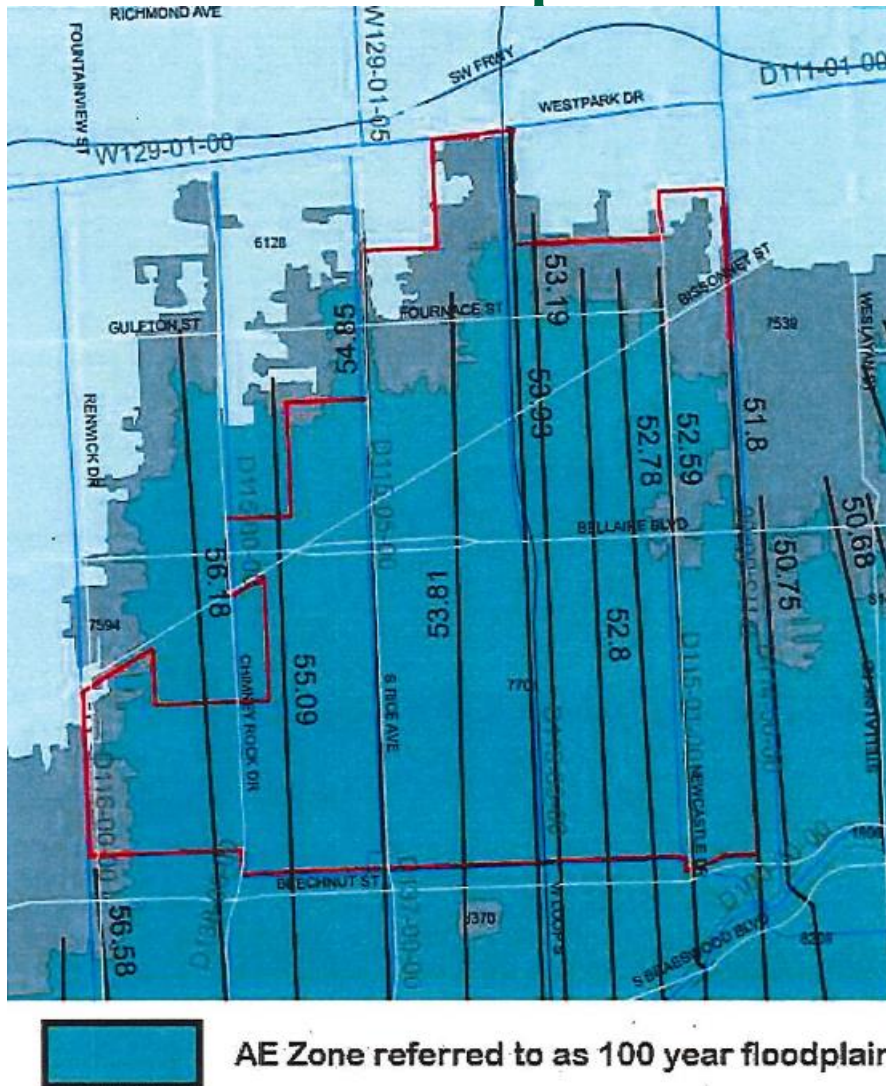
# Causes of Flooding



- Located within Brays Bayou Floodplain
- Backwater effect from Brays Bayou
- High average annual rainfall
- Flat topography
- Clay soil
- Land locked
- Aged storm sewer; not designed to current standards
- Significant overland sheet flow from north and west

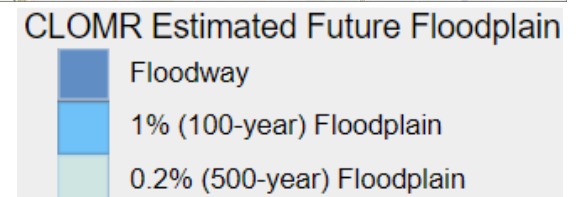
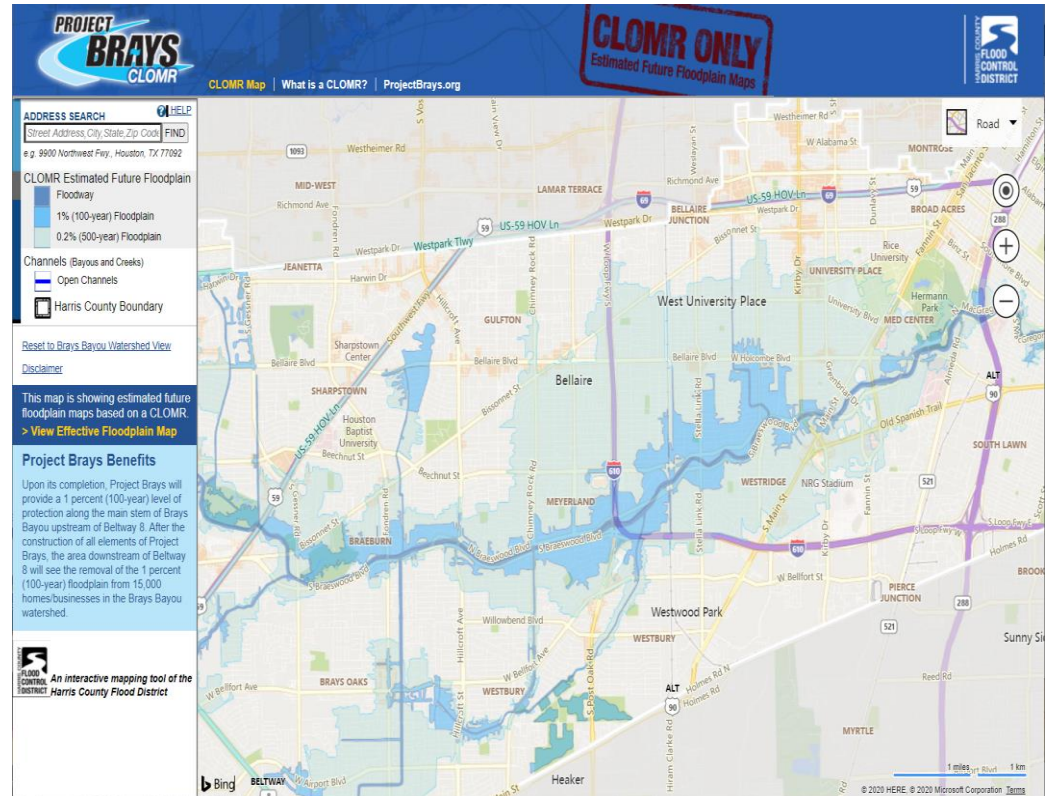


# Current Effective Floodplain Map (will be updated soon by FEMA)



- Approximately 80% of City of Bellaire is in 100 Year Floodplain
- 99% of City of Bellaire is in 500 Year Floodplain

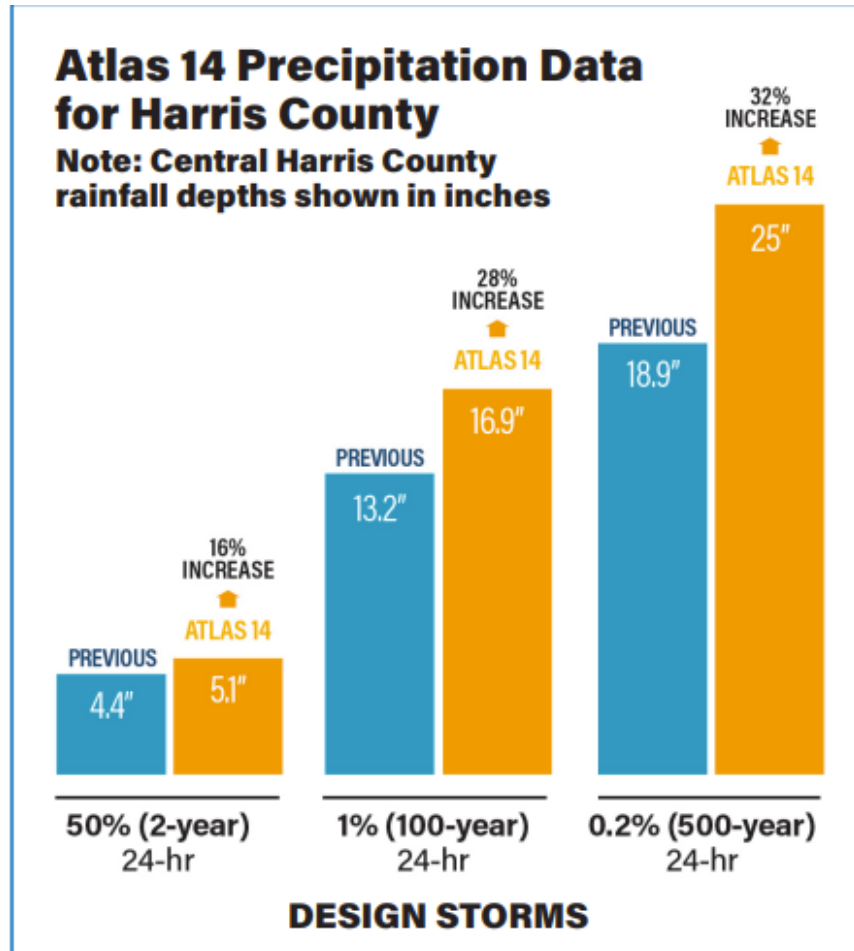
# Project Brays Improvements



- 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
- HCFCD MAAPNEXT updates will include ATLAS 14 data. Will be available in 2024



# Harris County Rainfall Depths (ATLAS 14)

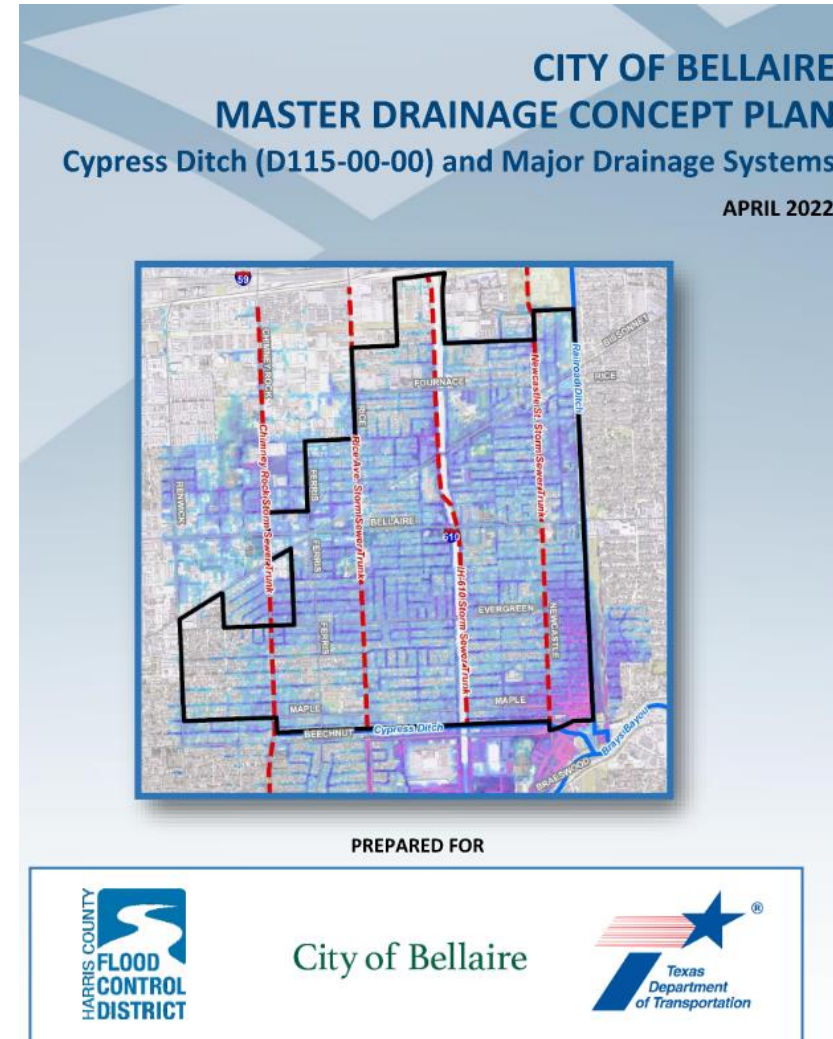


- ATLAS 14 was adopted in 2019
  - 2-Year : 5.1 Inches
  - 100-Year: 16.9 Inches
  - 500-Year: 25 Inches
- Detention Rate increased by 20%
- Based on ATLAS 14 data, Project Brays may provide 25-Year to 50-Year LOS
- Brays Bayou water levels can affect or entirely control the performance of local drainage

Source: Harris County Flood Control District

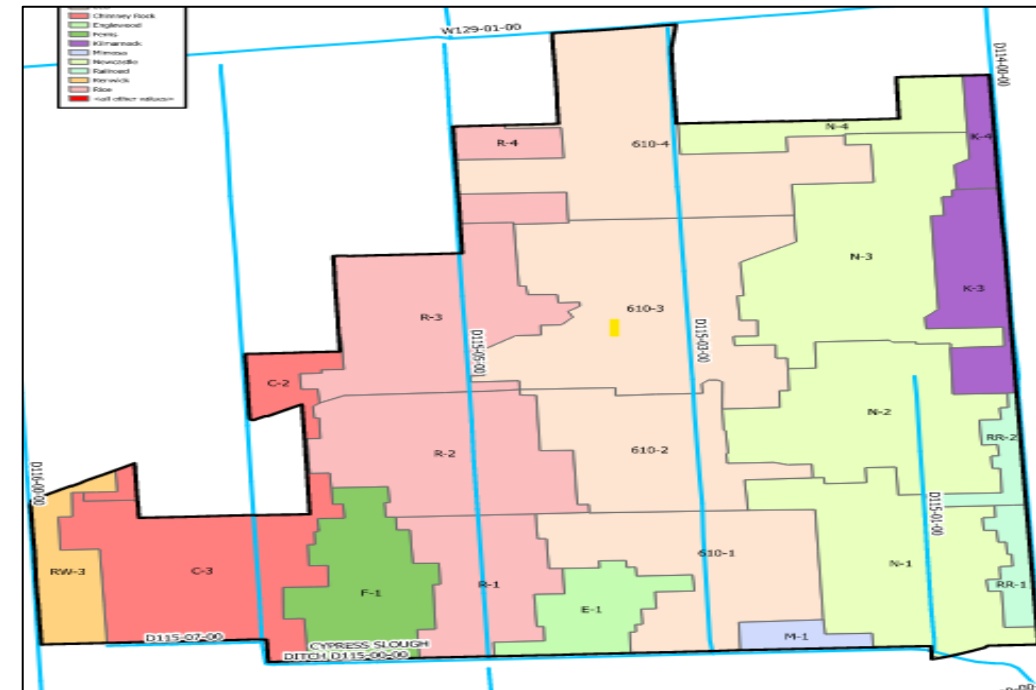
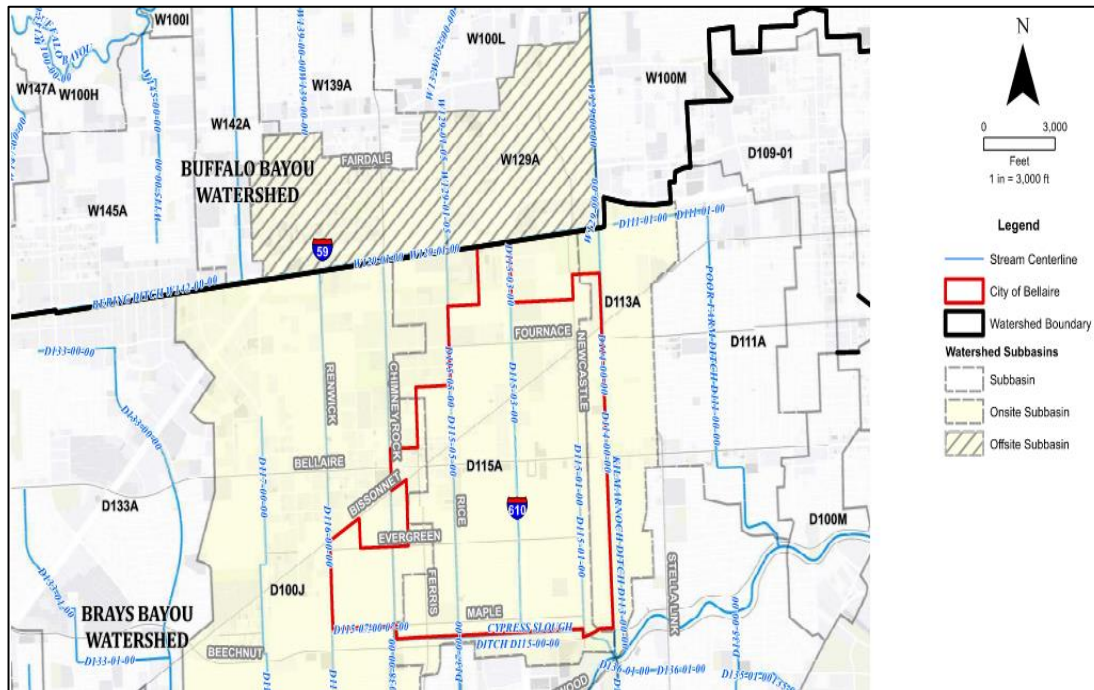
# Previous Studies

- Master Drainage Concept Plan (MDCP) -2022
- City of Bellaire Drainage Study – 2016
- Chimney Rock Master Drainage Plan - 2019

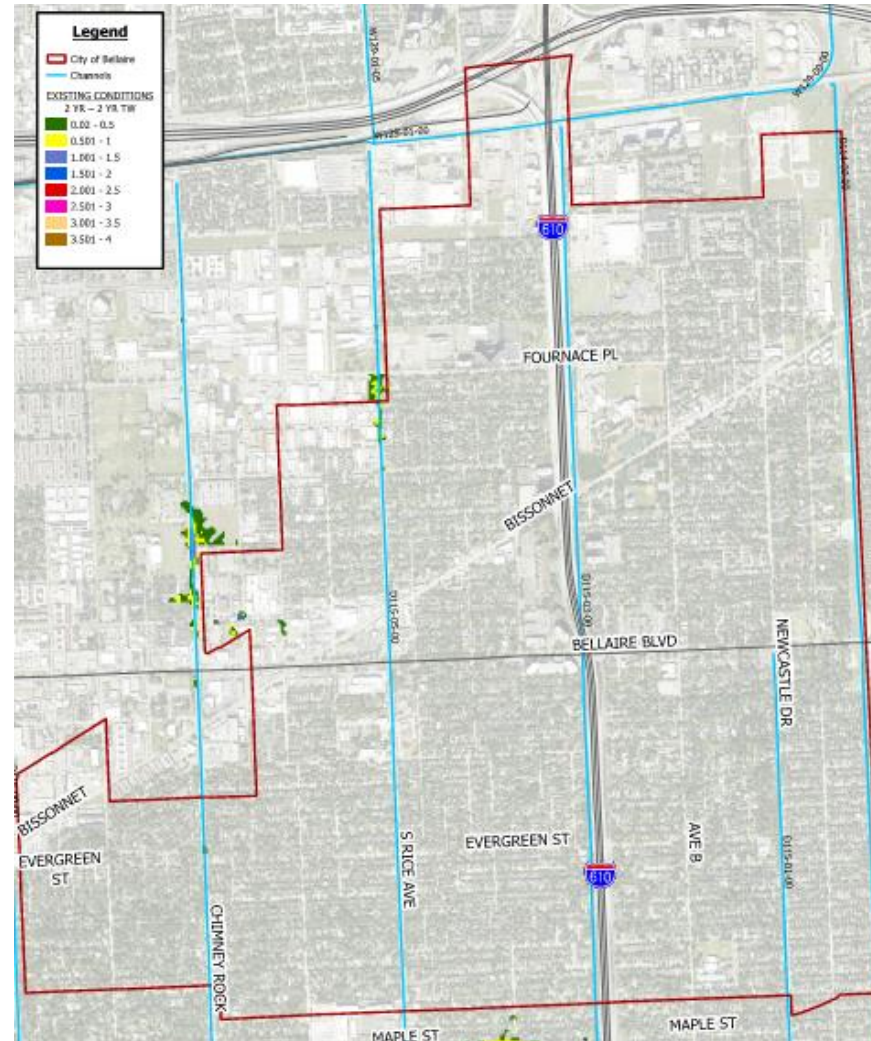




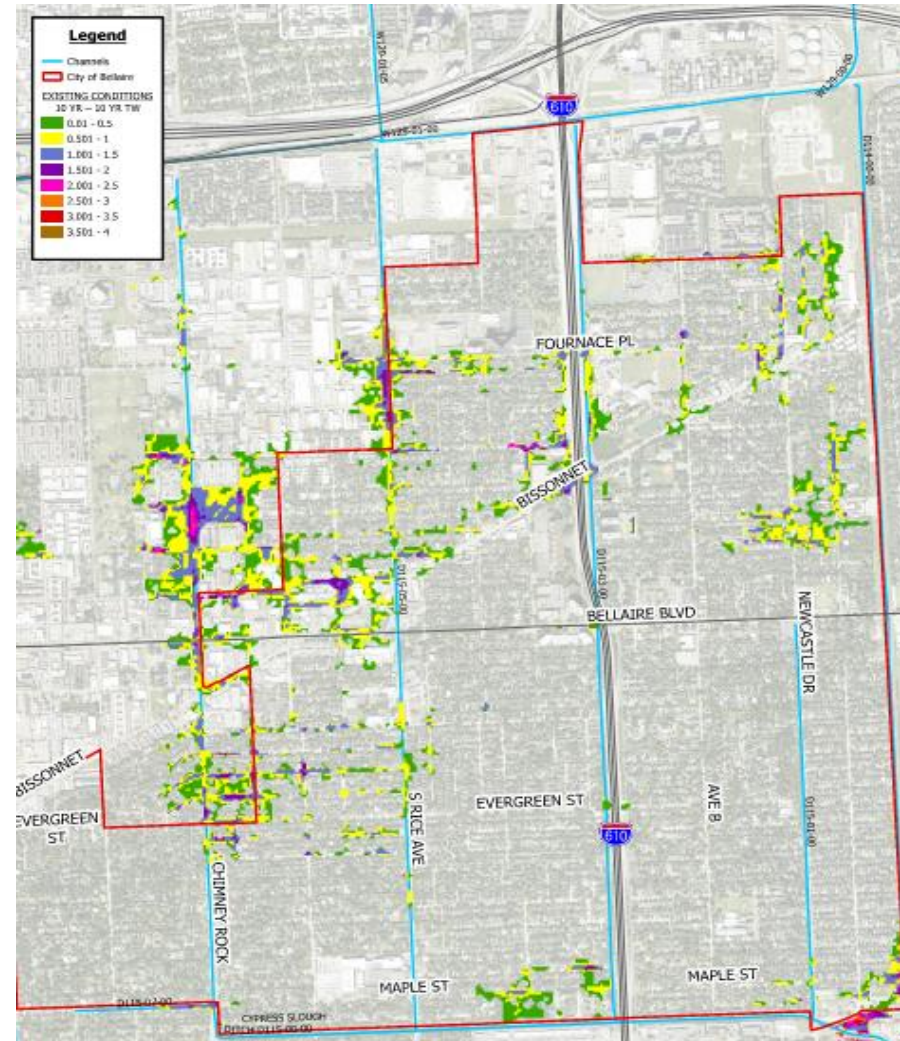
# Existing Conditions



# Existing Conditions (2 Year Inundation Maps)



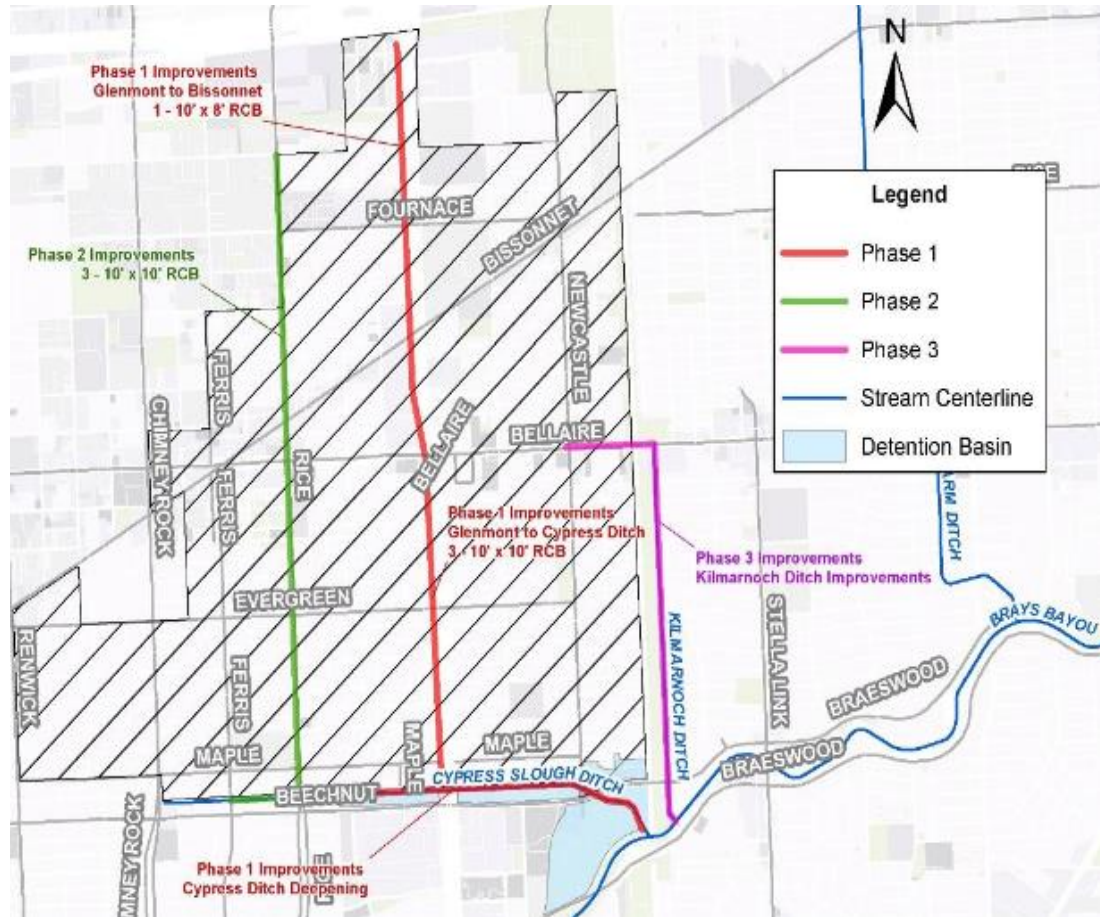
# Existing Conditions (10 Year Inundation Maps)







# Recommended Improvements by MDCP



- Cypress Slough Ditch widening
- RCB's under IH 610
- 3-10X10 RCB under South Rice
- 3-10X10 RCB under IH 610
- Kilmarnoch Ditch Improvements
- Would require detention to mitigate approximately 1,800 ac-ft

# What Next

## Local Drainage (inlet & storm sewers)

- Evaluate and upgrade inlets and storm sewer leads to current standards
- Rebuild streets to provide cascading overland flow and storage in the streets
- Maintenance (clogged storm sewers)

## Semi-Regional Drainage (major storm sewers, channel & ditches)

- Evaluate and upgrade major storm sewer to convey flow to Brays Bayou.
- Develop improvements that can collaboratively implemented with COH, TXDOT, HCFCD and Harris County
- Provide detention for impact mitigation

## Regional Drainage (Brays Bayou)

- Work with HCFCD understand Project Brays impact on Bellaire
- Work with HCFCD in identifying the Regional Detention options
- Work with HCFCD to reduce the backwater flows
- Work with City of Houston and TXDOT in identifying the projects which will reduce the overland sheet flow into Bellaire

# Flood Prevention Ordinance/Drainage Criteria

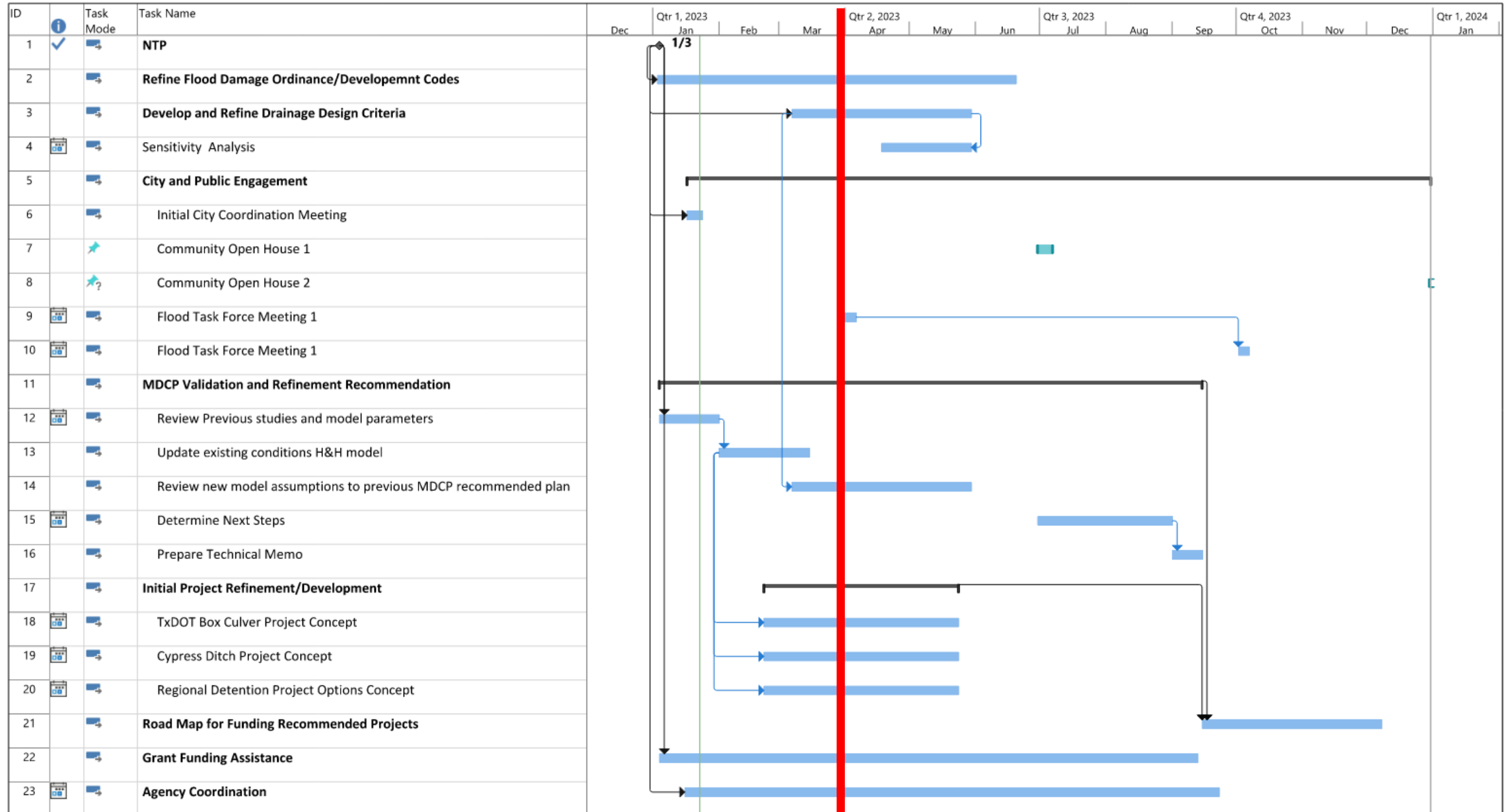
# Flood Damage Prevention & Drainage Criteria

- Assess if current home elevation requirements are sufficient.
- Assess current floodplain fill mitigation requirements.
- Assess Detention Requirements
- Assess and update the Building Code requirements
- What else needs to be included??



# Future Project Identification


# Schedule




# Path Forward

- Update Flood Prevention Ordinance
- Update Drainage Criteria
- Update Building Code
- Define the future projects
  - Analyze Cypress Ditch Improvements
  - Analyze IH 610 Improvements
  - Regional detention alternatives
- Identify strategic locations for detention mitigation
- Identify Funding Opportunities/Partners
- Utilize seed funding to leverage the design and construction

# Drainage Program Website


City of Bellaire Drainage Improvement Program

[Project Information](#)
[Contact](#)



## Project Description:

The City of Bellaire, TX intends to undertake a capital projects program to advance significant flood risk reduction activities across its jurisdiction. These activities shall be informed by the recently completed Master Drainage Concept Plan (MDCP), and pursuant to strategic direction from City Council.

City of Bellaire Drainage Improvement

Category  
Link One

Category  
Link One


City of Bellaire Drainage Improvement Program

[Project Information](#)
[Contact](#)

## Contact Us

Stay connected and leave your comments on the Bellaire Drainage Improvement Plan

**Email:**  
drainage@bellairetx.gov

Name \*

First Name


Last Name

Email \*

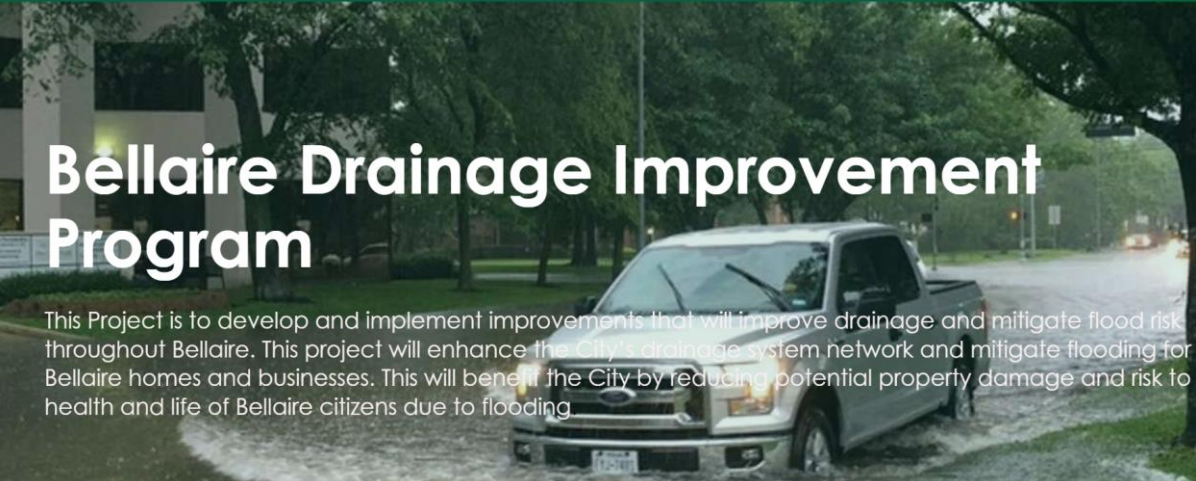
Message \*

Address (Optional)

Address 1


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## Bellaire Drainage Improvement Program

This Project is to develop and implement improvements that will improve drainage and mitigate flood risk throughout Bellaire. This project will enhance the City's drainage system network and mitigate flooding for Bellaire homes and businesses. This will benefit the City by reducing potential property damage and risk to health and life of Bellaire citizens due to flooding.

<https://bellairedrainageimprovementprogram.org/>

# Questions